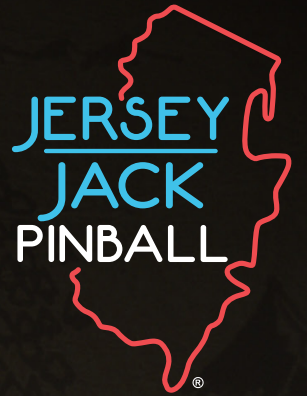


November 2018
70-0002-00



THE HOBBIT™

MOTION PICTURE TRILOGY

Operations Manual Includes:

Game Setup - Testing & Adjustments - Parts Information - Reference Diagrams & Schematics - Service & Troubleshooting

Jersey Jack Pinball®, 1645 Oak Street, Lakewood, New Jersey 08701 Telephone: (732) 364-9900



Manual Release 3.4

Information current at time of release (3.0).

Visit our customer support website, <https://www.jerseyjackpinball.com/support/>, and register your game. Be sure to include the game serial number. For your records, write the game serial number in the manual.

Serial Number _____

Jersey Jack Pinball® reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

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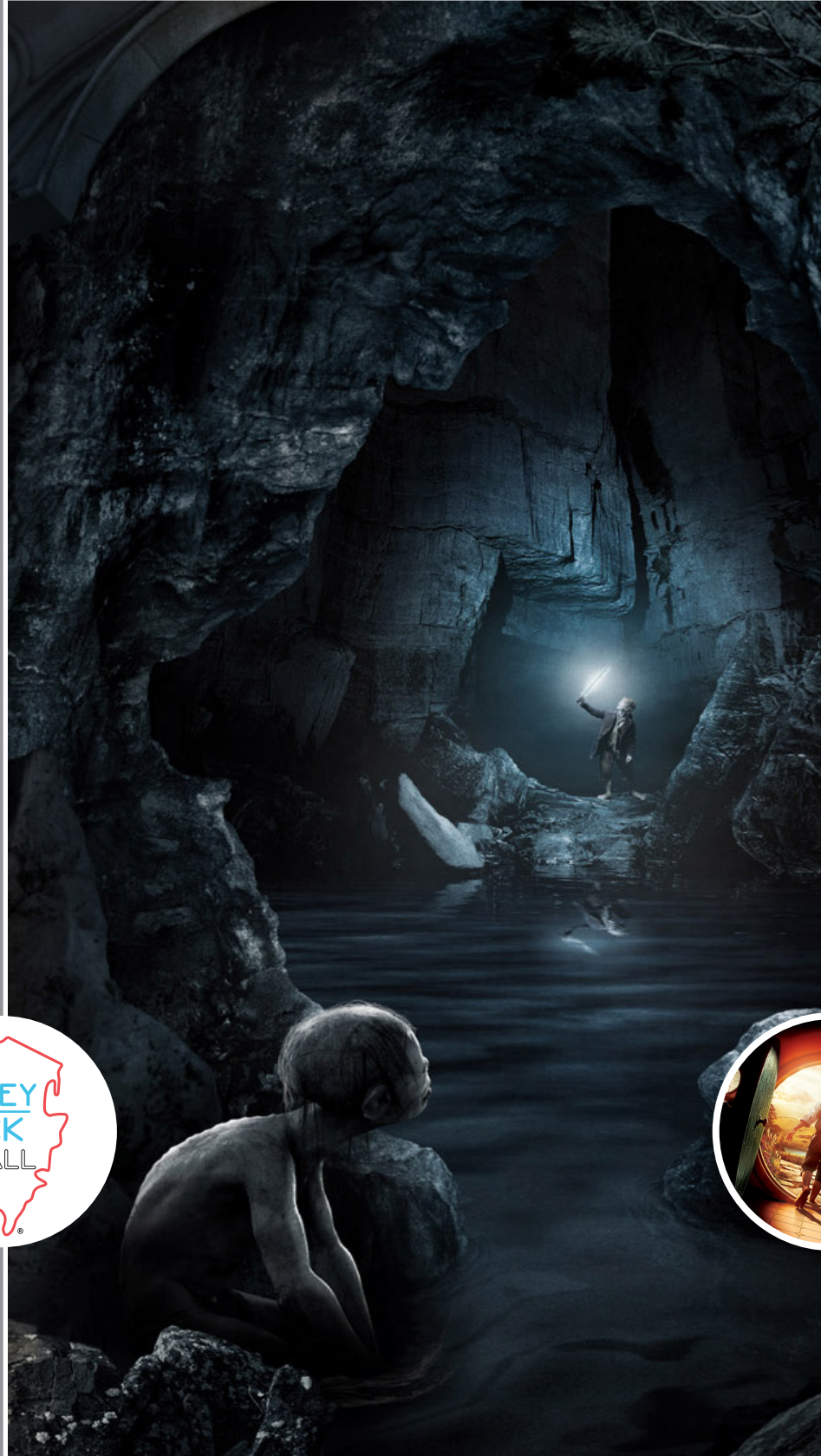
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Section A

Game Assembly & Setup



A.1 Unpacking Your Hobbit Game

1) Using wire cutters, remove all shipping bands from the outside of the carton, noting the side with the “TRUCK THIS SIDE ONLY” marking (see figure A1). With a utility knife and needle-nose pliers, carefully cut the tape and remove all staples along the seams of the carton’s top flaps, then fold them open (see figure A2). Remove the large, flat sheet of cardboard. Pull out the large parts box (red in figure A2) and remove its contents. Check all loose parts against the packing list on this page.

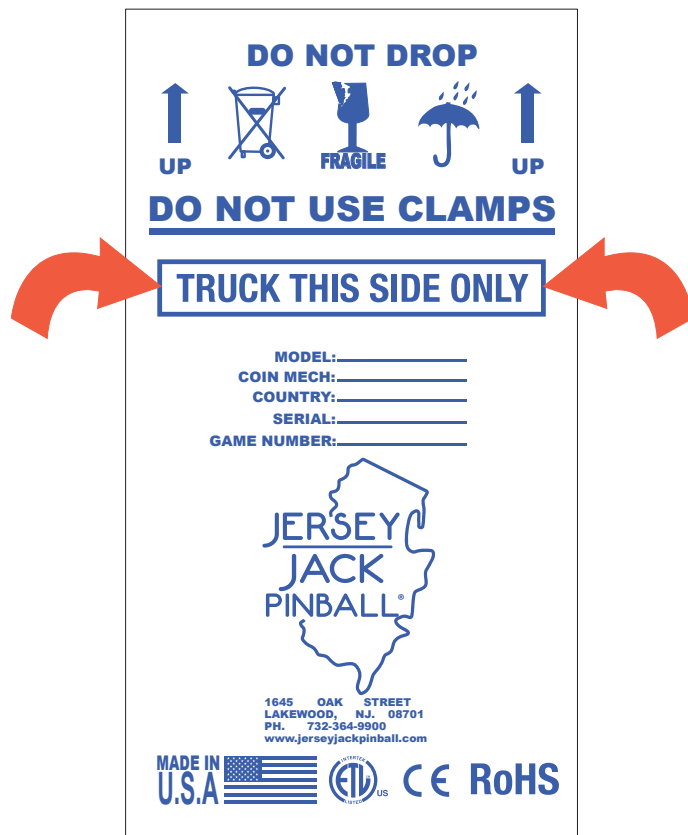


Figure A1. The “TRUCK THIS SIDE ONLY” side of the box.

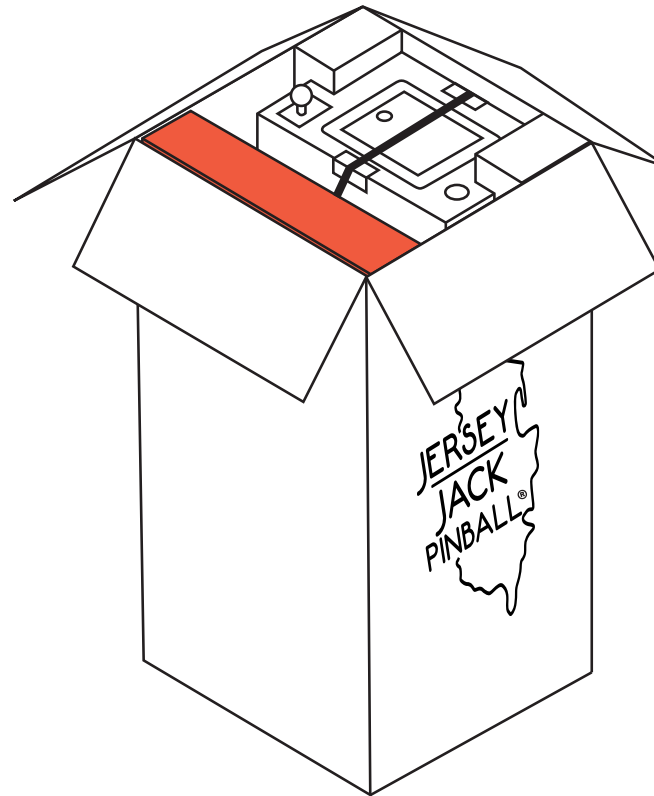


Figure A2. Opening the shipping carton.

Tools Required:

Wire cutters
Needle-nose pliers
Utility knife
Ratchet and 5/8” socket (or 5/8” wrench)
#2 Phillips screwdriver
Torpedo bubble level

Large Parts Box Packing List

4 pinball machine legs, with levelers and tightening nuts
8 acorn-head leg bolts
1 plumb bob weight, with nylon wing nut
5 steel mirror-finish pinballs
1 USA line power cable
1 “L”-shaped, 5/16” hex key
assorted spare game decals
spare set of slingshot plastics
assorted plastic game key fobs
game manual CD

Note: If anything is missing from your parts box, send an email to warranty@jerseyjackpinball.com for a replacement.

If you wish to save your shipping carton:

2) With the help of at least one other person, carefully tip the carton over and lay it on its “TRUCK THIS SIDE ONLY” side (see figure A3a). Using the nylon strap as a handle, slide the game and packing materials out of the carton.

Note: You may need to spread a blanket or some other form of cushion under the game to protect the floor.

3) DO NOT CUT THE NYLON STRAP holding the backbox down at this point. Remove the foam padding from the corners of the game and carefully stand it upright again (as it was in the carton during shipping).

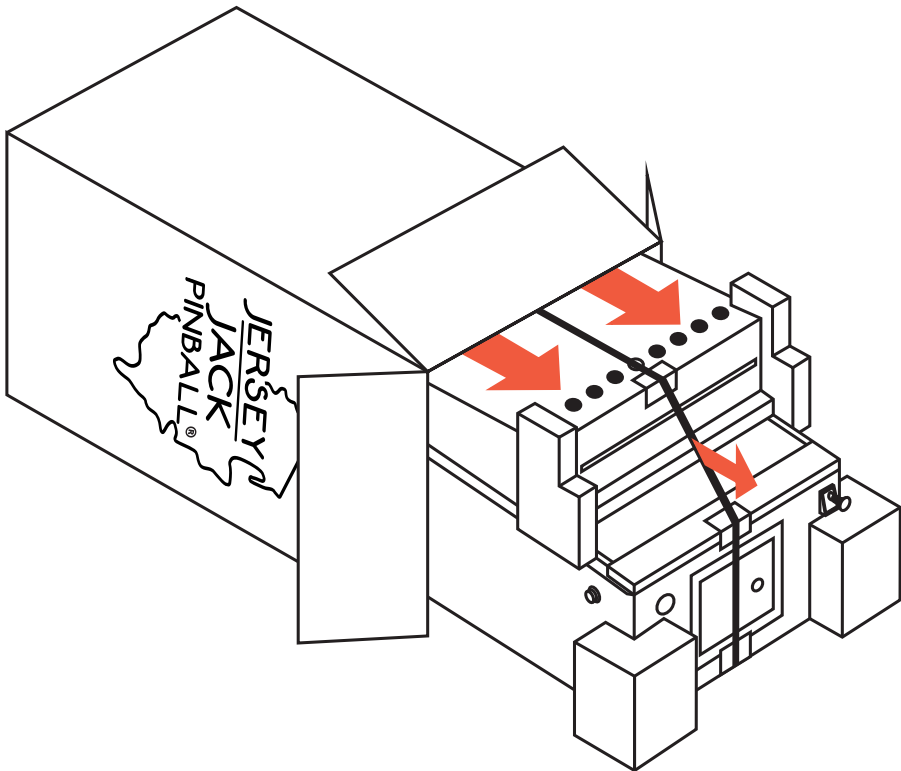
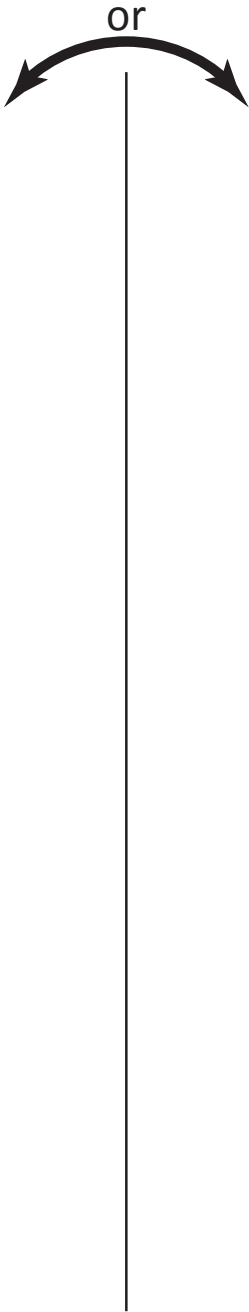


Figure A3a. Sliding the game out of the carton.



If you do not wish to save your shipping carton:

2) Using a utility knife, remove the “TRUCK THIS SIDE ONLY” side of the shipping carton (see figure A3b). Carefully cut down the left and right sides of the box. Let the flap fall to the floor, then cut across the bottom edge (taking care not to damage the floor).

3) DO NOT CUT THE NYLON STRAP holding the backbox down at this point. Remove the foam padding from the corners of the game.

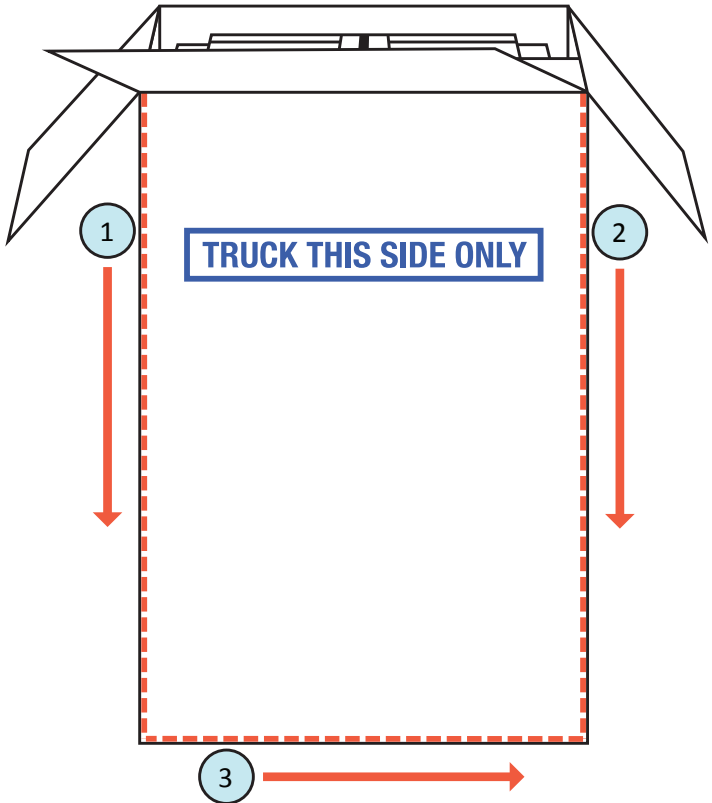


Figure A3b. Removing the “TRUCK THIS SIDE ONLY” side of the carton.

4) Locate the game's four legs. Adjust the tightening nut and leg leveler on each leg (see figure A4). For the two front legs, position the nut all the way down, next to the foot of the leveler. For the two rear legs, position the nut approximately three-quarters of the way up the leveler. Thread the leveler into each leg until the tightening nut is against its underside.

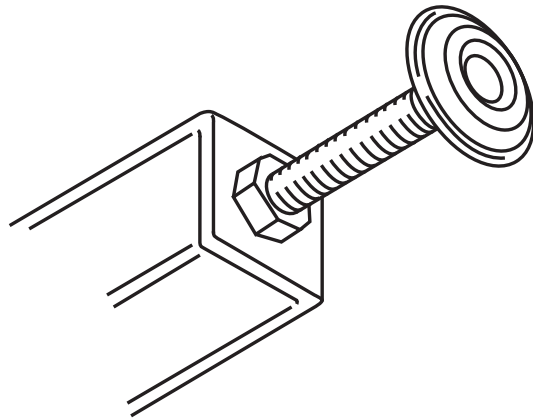


Figure A4. Adjusting a leg leveler and tightening nut.

5) Locate the eight acorn-head leg bolts in the loose parts. Thread 2 leg bolts through each leg and attach it to the cabinet (see figure A5). Using a 5/8" socket and ratchet or a 5/8" wrench, tighten the bolts firmly, while maintaining pressure (in the direction of the red arrow) on each leg.

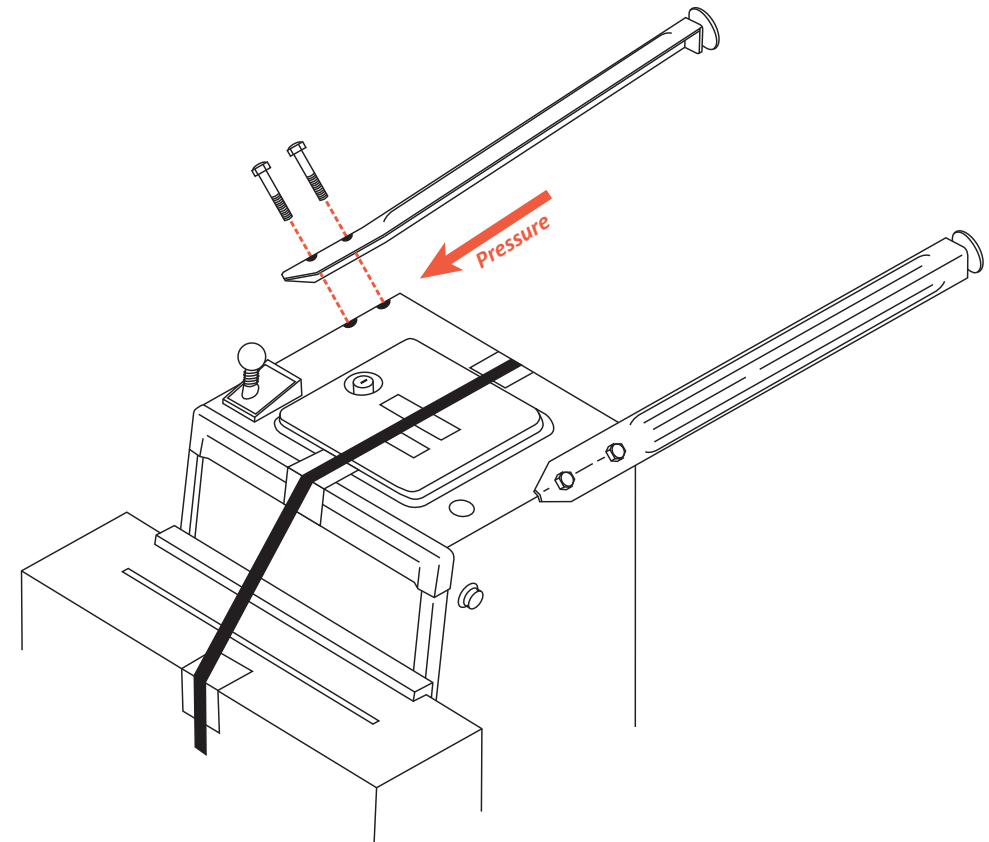


Figure A5. Installing the front legs and cabinet protectors.

6) With the help of at least one other person, carefully tip the game onto its front legs. Lift the rear of the cabinet and have two people support it or place it on a sturdy support. As with the front legs, attach the two rear legs, using the four remaining acorn-head bolts. Tighten all bolts firmly, while maintaining upward pressure on the legs (see figure A6). Lower the game onto its legs.

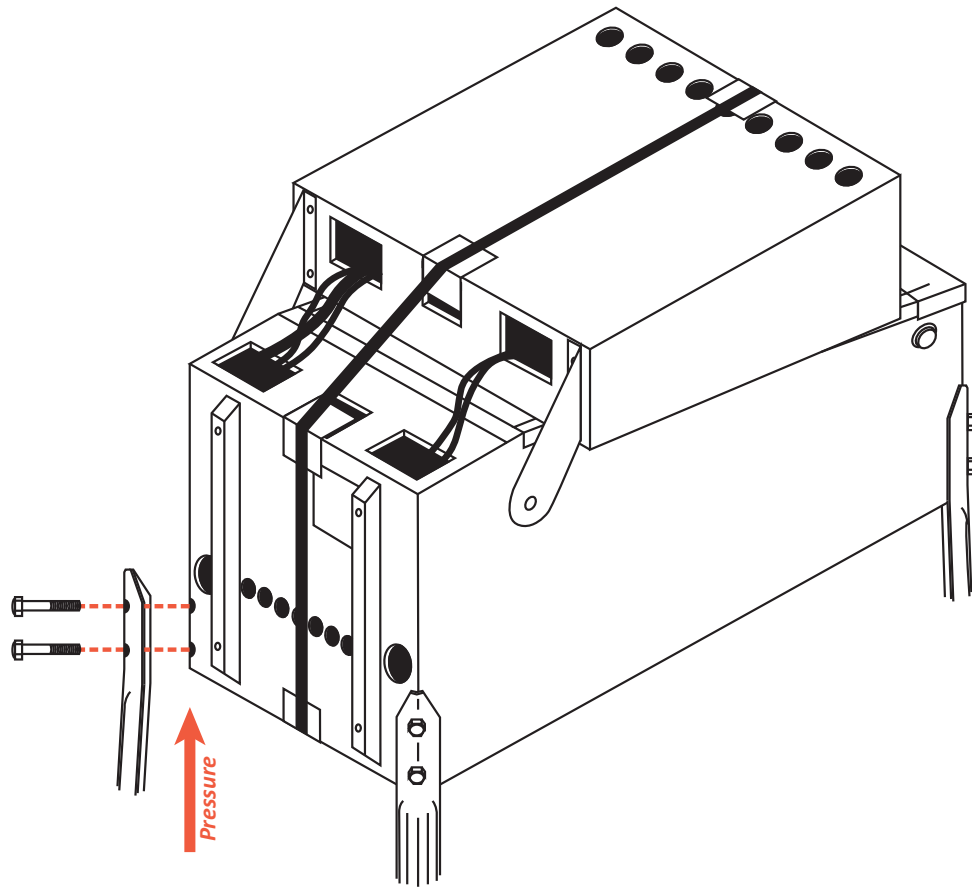


Figure A6. Installing the rear legs and cabinet protectors.

7) Using wire cutters, cut the nylon strap holding the backbox down (**CAUTION:** protect your eyes and have helpers/bystanders move away! The ends of the cut strap will likely whip violently away from the game!). Remove the remainder of the packing material from the game and raise the backbox to its upright position (see figure A7). Ensure that the cables and wires in the neck of the game do not get pinched at any time during this process.

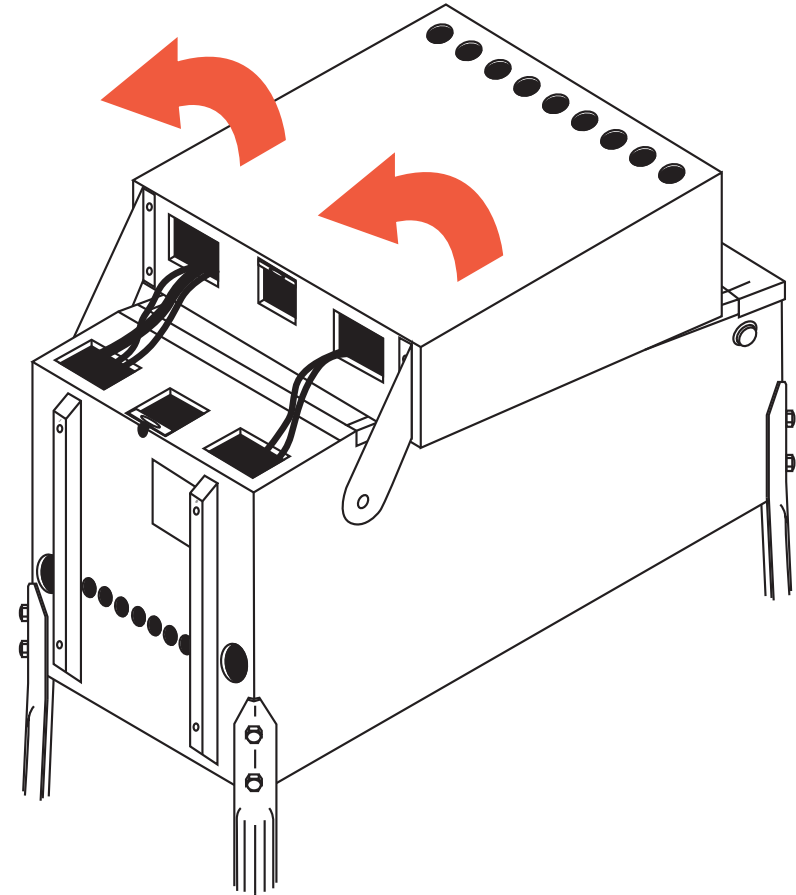


Figure A7. Raising the backbox to its upright position.

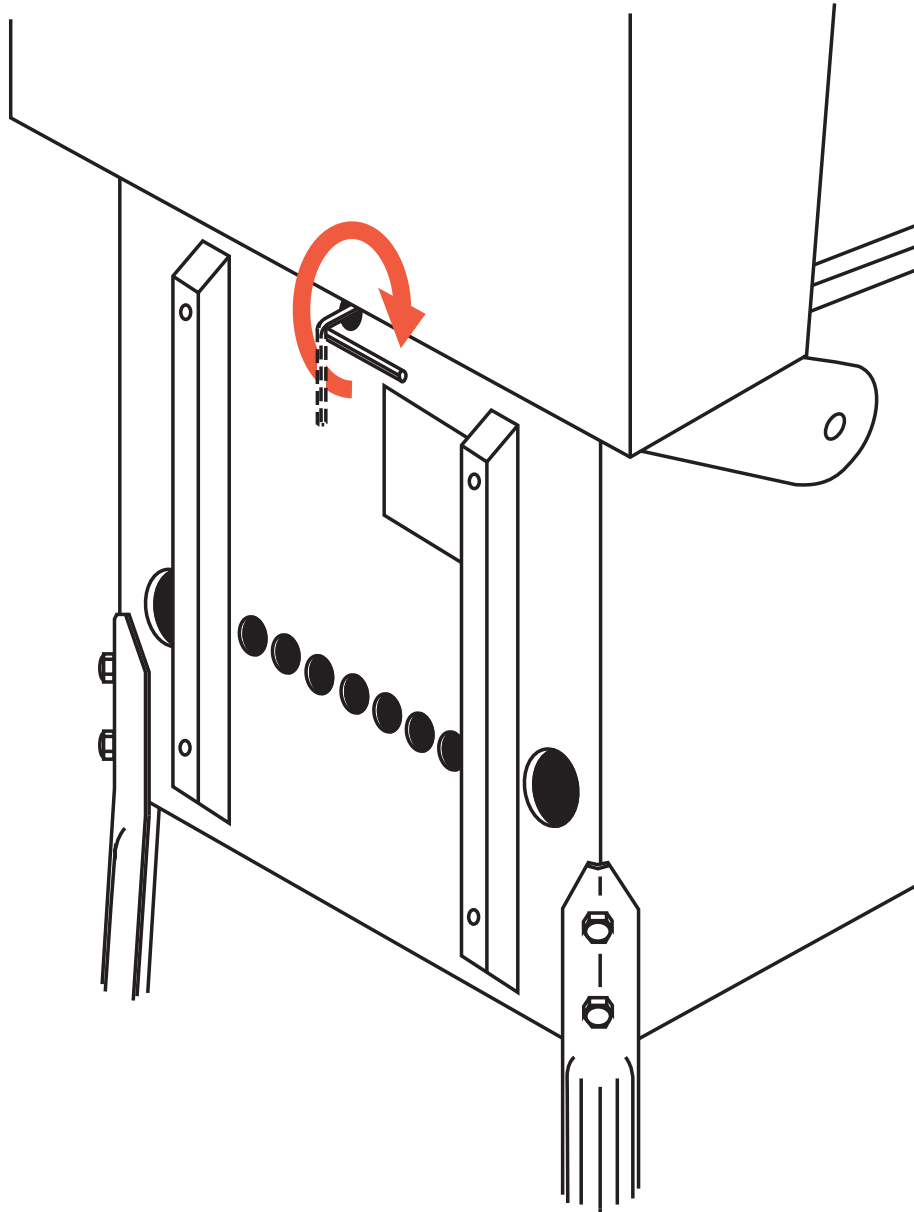


Figure A8. Locking the backbox in the upright position.

8) Locate the “L”-shaped, 5/16” hex key for the backbox Roto-Lock in the loose parts. Insert it into the hole at the base of the backbox and turn it a full 270 degrees CW (see figure A8).

Note: When the Roto-Lock is in the fully locked position, the key will not turn any further in the clockwise direction.

9) Using at least two people, lift the game and move it to the intended play area.
DO NOT SLIDE LEGS ACROSS THE FLOOR.

10) You will find the coin door keys attached to the ball shooter, on the front of the game. Cut them loose with a pair of wire cutters. Remove the playfield glass: 1) open the coin door, 2) slide the yellow lockdown bar lever to the left, 3) lift the lockdown bar straight up and out, 4) CLOSE AND LOCK THE COIN DOOR (to prevent scratching of playfield glass), then 5) slide the playfield glass off of the front of the cabinet (see figure A10). Carefully set the glass aside.

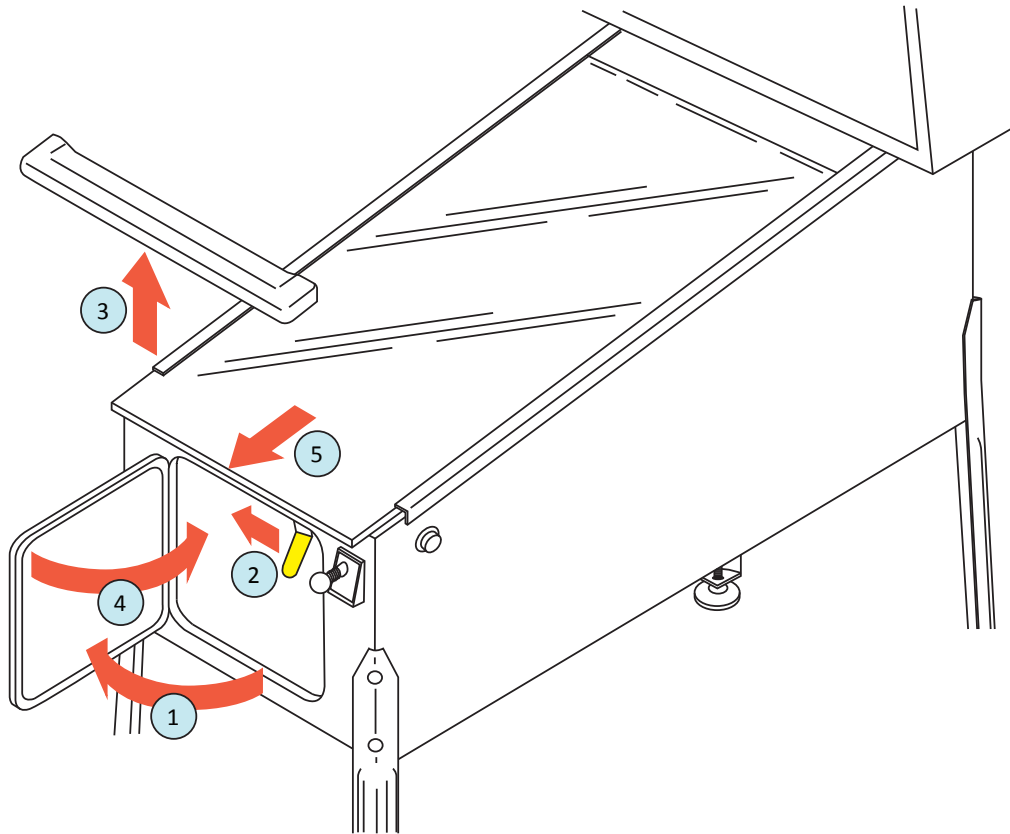


Figure A10. Removing the playfield glass.

11) Locate the game's five pinballs in the loose parts. Place all five balls in the ball trough (drop them onto the playfield, below the flippers, and allow them to drain). Level the game side-to-side by placing a bubble level on the playfield surface (top

and bottom) and adjusting the leg levelers and tightening nuts accordingly. When finished, secure the tightening nut against the underside of each leg.

12) Your Jersey Jack Pinball® playfield is designed to rest in four distinct positions in its cabinet for game play, cleaning and maintenance. Figure A11 shows the playfield in its standard position.

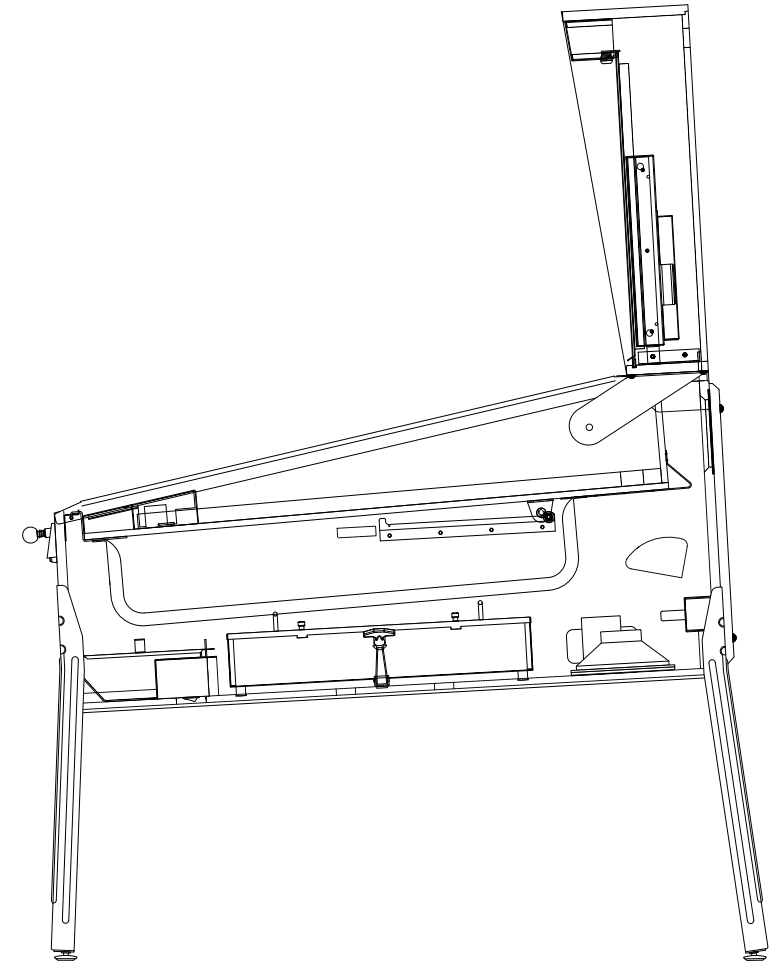


Figure A11. Playfield in the game play position.

13) Grasp the playfield under its bottom arch and swing it upward until the playfield support tubes underneath are fully visible (figure A12). Move the playfield to position 2 (figure A13). Pull it upward and outward until the first pair of rubber feet reach the top of the lockdown bar receiver; then lower the playfield, resting the rubber feet in the steel channel.

Note: The game has a safety mechanism to keep the balls in the trough from falling out when the playfield is lifted.

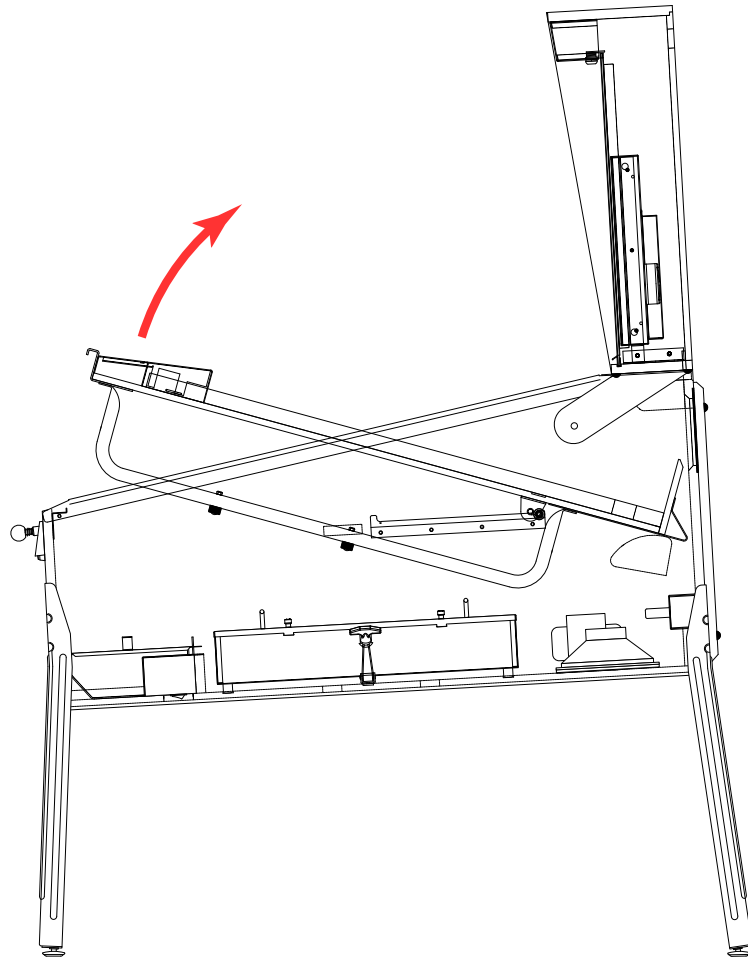


Figure A12. Swing the playfield upward.

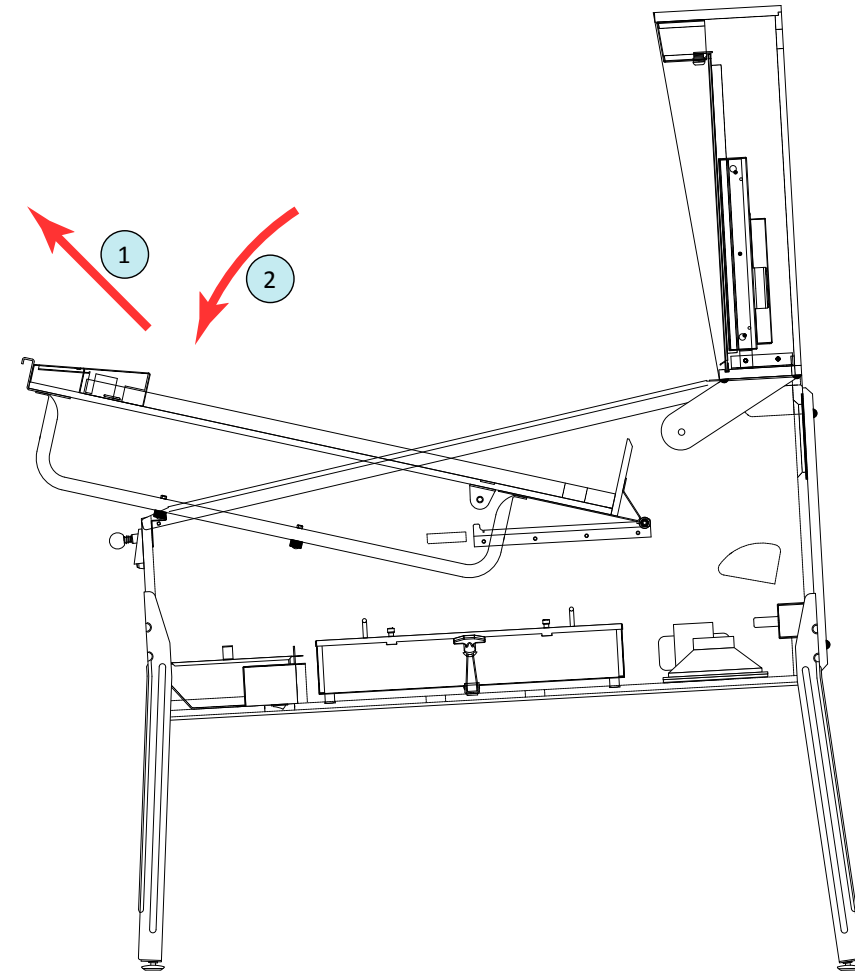


Figure A13. Moving the playfield to position 2.

14) Move the playfield from position 2 to 3 (figure A14). Pull it upward and outward until the second pair of rubber feet in the support tubes reach the top of the lockdown bar receiver; again, lower the playfield, resting the feet in the channel.

15) Move the playfield from position 3 to 4 (figure A15). Pull it outward until the playfield support/slide bracket stop is reached; then swing the playfield up, resting the bottom arch against the front of the backbox.

Note: As shown in figure A16, the playfield can be completely removed from the cabinet. Disconnect all connectors in the wiring harness and, with one person at the front of the playfield and one at the back, carefully lift it straight up and out of the cabinet. The playfield can then be placed on any flat surface, supported by its tubes, for maintenance.

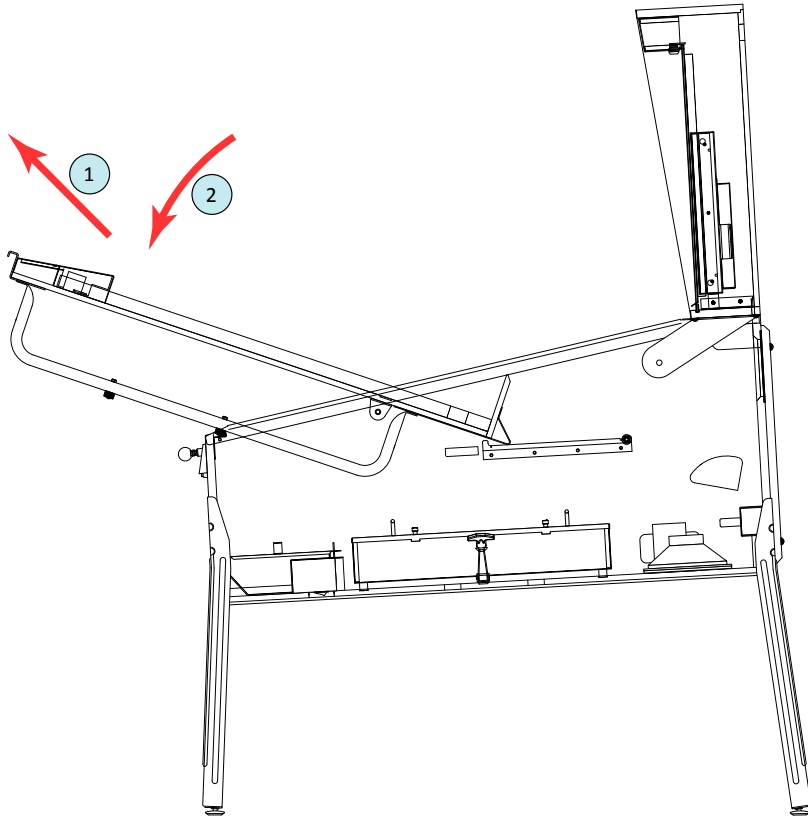


Figure A14. Moving the playfield to position 3.

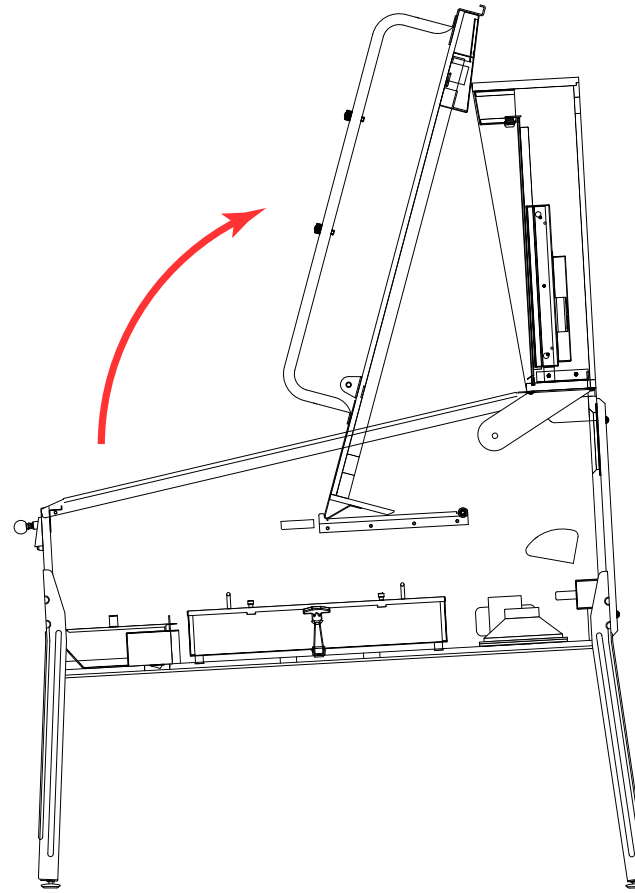


Figure A15. Moving the playfield to position 4.

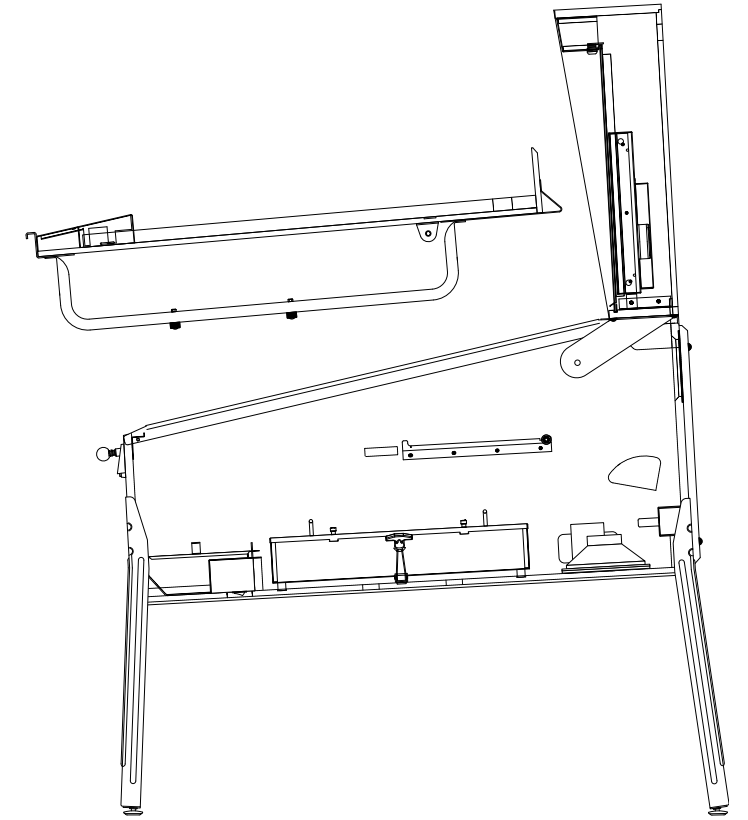


Figure A16. The playfield is removable.

16) Locate the plumb bob weight and nylon wing nut in the loose parts. Locate the plumb bob tilt hanger wire and contact brackets, mounted on the inside, left sidewall of the lower cabinet. Slide the weight onto the straight end of the hanger wire and thread the wing nut onto the shaft underneath it (figure A17). Raising the weight higher up the hanger wire (by tightening the wing nut underneath it) makes the tilt mechanism more sensitive; lowering the weight makes it less sensitive.

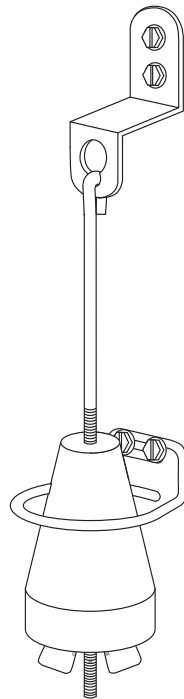


Figure A17. Assembled plumb bob tilt mechanism.

17) Locate the power cord in the loose parts. Remove the line cord cover plate from the rear of the lower cabinet. Plug the female end of the power cord into the exposed receptacle, inside of the back of the machine. Replace the line cord cover plate and plug the other end of the power cord into a grounded wall outlet. **DO NOT CUT THE GROUND LUG OFF OF THE POWER CORD!**

18) Power up the game (the on/off switch is located under the cabinet, just behind the right front leg; it rocks in one direction to turn the game on and in the reverse direction to turn it off) and test it for proper operation. Adjust game settings as appropriate (see Game Menu System, Section B). Reinstall the playfield glass (and lockdown bar) in the cabinet; your game is ready to play!

Note: Before transporting the game, lower the backbox (figure A18). Insert the 5/16" hex key into the hole at the base of the backbox and turn it a full 270 degrees CCW. Ensure that cables and wires in the neck of the machine do not get pinched or pulled taut as the backbox is laid down. Place a large piece of cardboard (or the piece of foam used when the game was shipped) between the top lip of the backbox and the lower cabinet to protect the cabinet side rails. Tie or strap the backbox securely to the cabinet to prevent it from bouncing during transit.

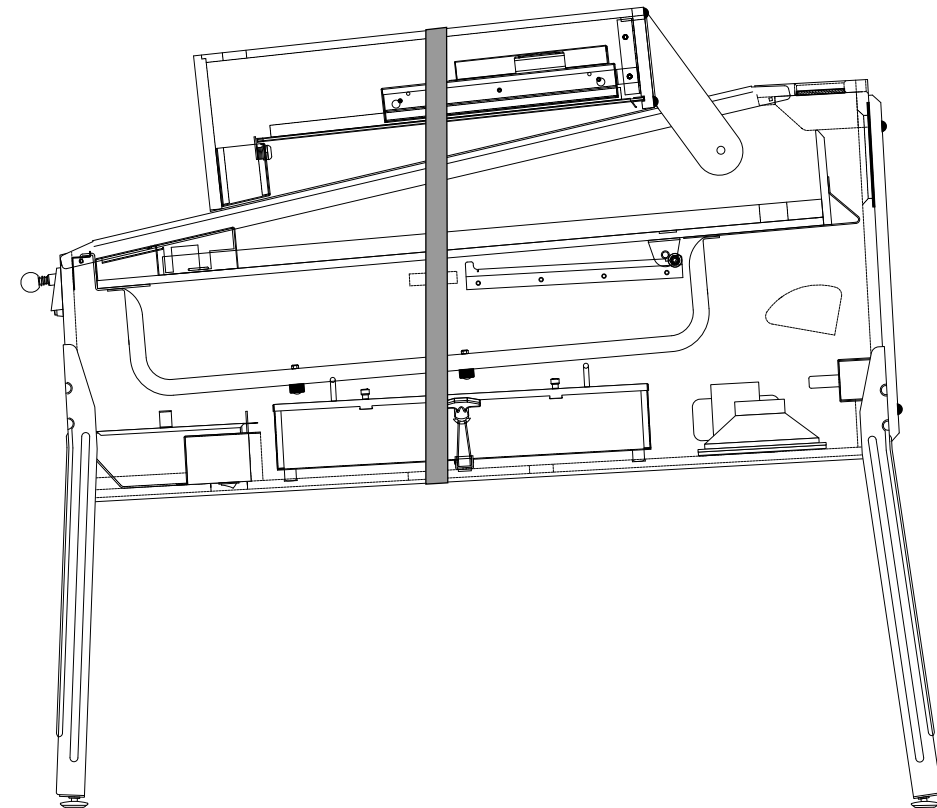
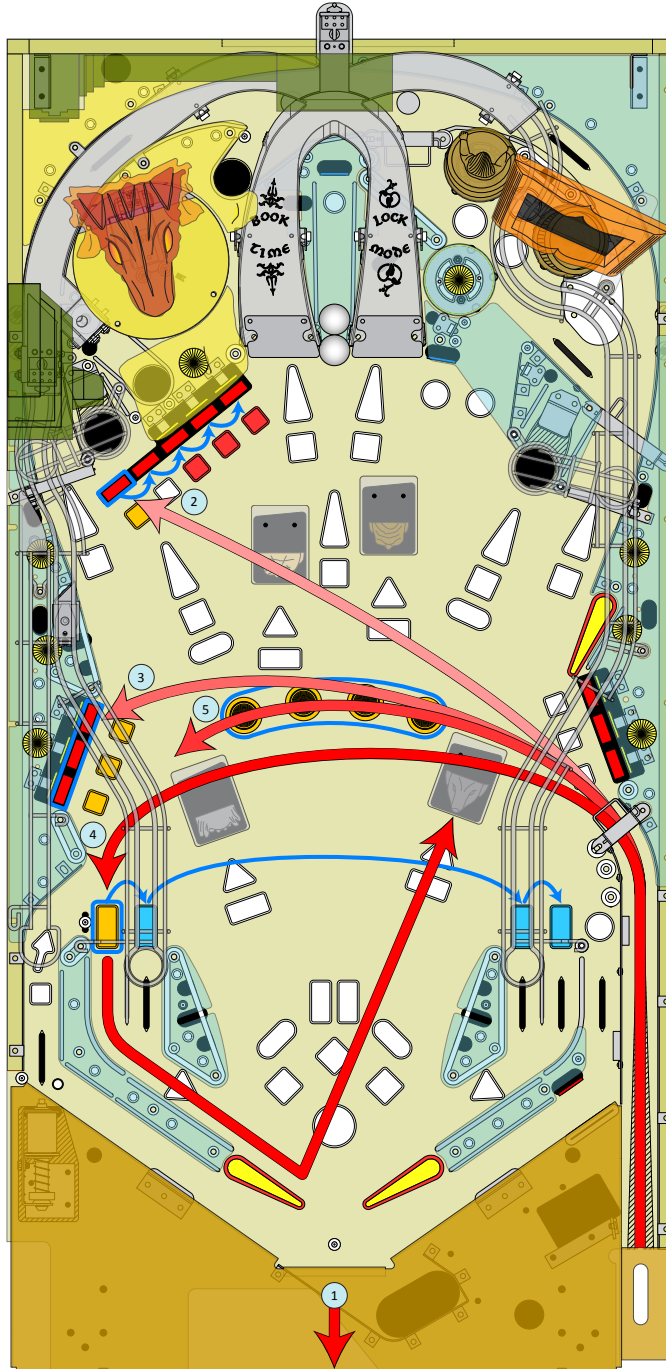


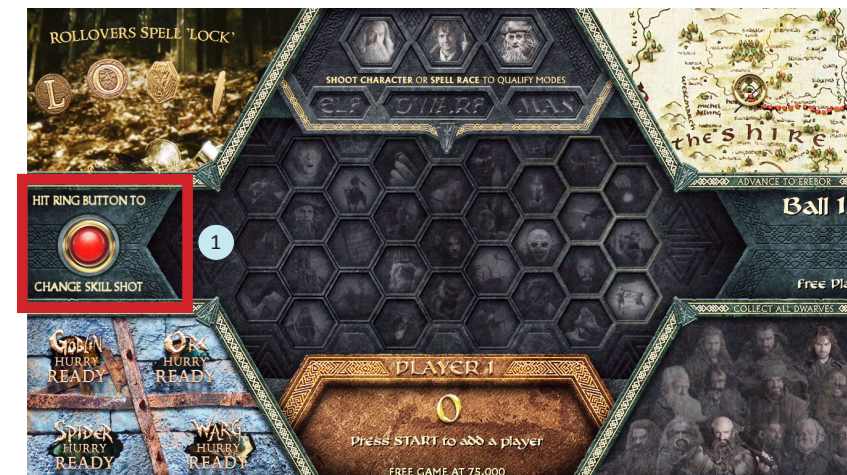
Figure A18. Transport game with the backbox lowered and secured.



A.2 Hobbit Rules & Shot Maps

Skill Shots

- 1) Before you plunge the ball, you can use the Ring Button to choose your skill shot (below).
Hint: Skill shot awards are not all necessarily equal!
- 2) Plunge the ball with medium strength and try to hit the moving **DWARF** drop target in the upper, left portion of the playfield. If you hit the drop target, a skill shot is awarded.
- 3) Plunge the ball lightly and attempt to hit the **ELF** drop targets on the left side of the playfield. The more drop targets you knock down, the higher your skill shot award will be.
- 4) Again, plunge the ball lightly to roll, in a smooth arc, across the **LOCK** rollovers in the center of the playfield. The more rollovers you hit, the higher your skill shot award will be. Hit all four and you're ready to lock your first ball for Smaug Multiball!
- 5) Plunge the ball very lightly to drop the ball into the yellow beast inlane at the bottom of the playfield. The yellow light will be moving across the four inlanes. Use a flipper to hit the associated beast pop-up character when it comes out of the playfield for a nice skill shot award.



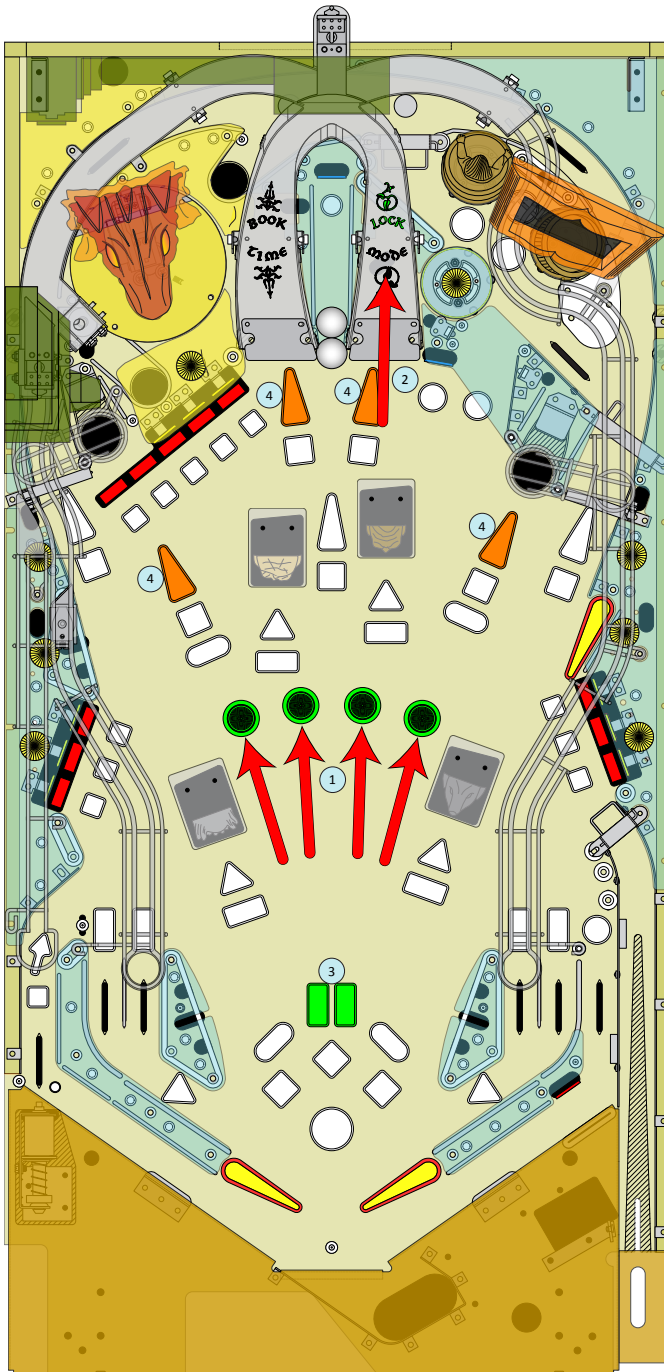
Smaug™ Multiball

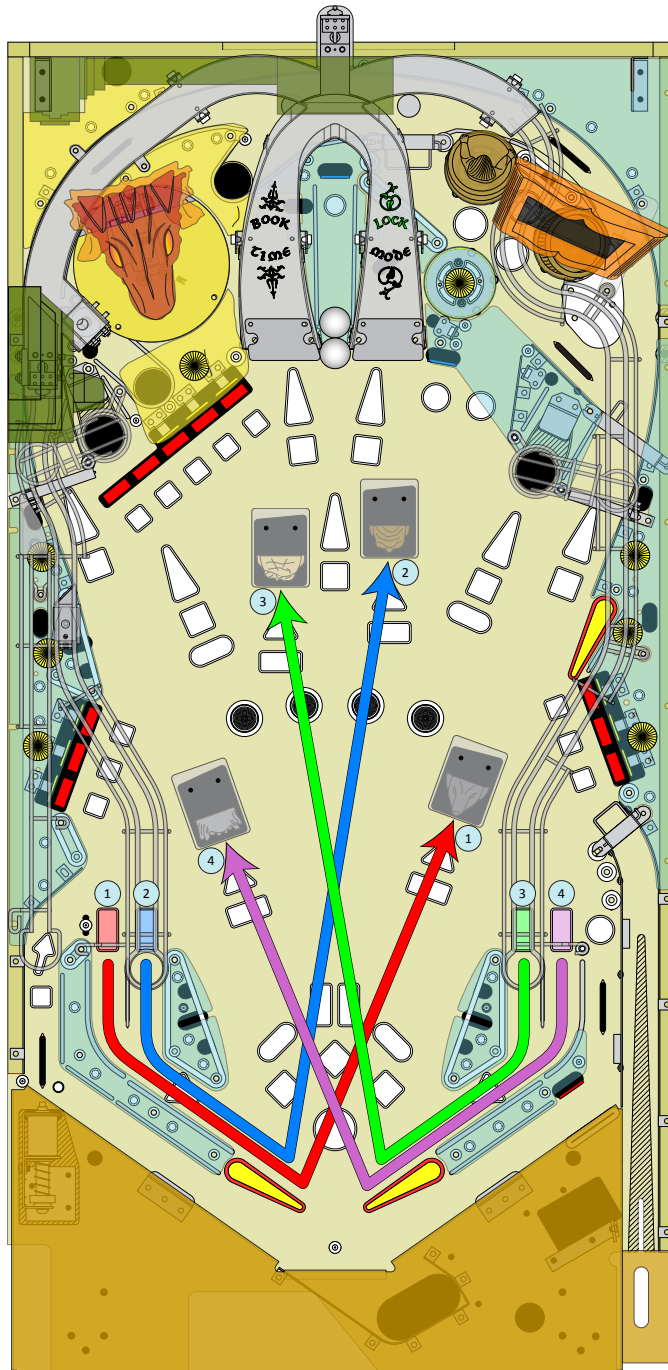
1) Spell **LOCK** by hitting the **L**, **O**, **C** & **K** rollovers in the center of the playfield. Letters that have not yet been hit will blink on and off; letters that have been hit will remain on (no blinking). The upper, left corner of the 27" LCD also shows which letters have been spotted (below, left).

2) When all four **LOCK** rollovers have been hit, the **Bilbo Baggins™** (right) ramp will light for ball lock. Shoot this ramp to virtually lock a ball. The ball will be diverted to Smaug, who will momentarily awaken to “catch” the ball, drop it below the playfield and grant you a lock. **Note:** This is not a physical lock; the same ball will then be kicked up onto the left wire ramp, by the **Balin™** (left) VUK, for continued play.

3) The **LOCK 1** and **LOCK 2** playfield inserts track/indicate your progress toward Smaug™ Multiball. **LOCK 1** lights when you lock your first ball; **LOCK 2** lights when you lock your second. When both are lit, your next lock shot (on the **Bilbo Baggins™** (right) ramp) will begin Smaug™ Multiball (three balls). Progress is also shown in the upper, left corner of the 27" LCD. The number of pinballs shown in the foreground tells you how many balls are locked.

4) Shoot the lit (flickering orange) arrow shots to collect Jackpots (below, right). Hit seven Jackpot shots for a chance at the Super Jackpot!



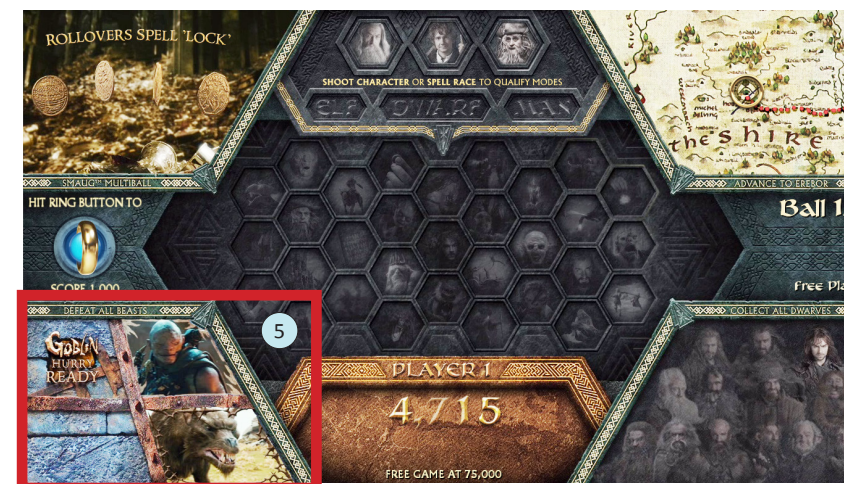


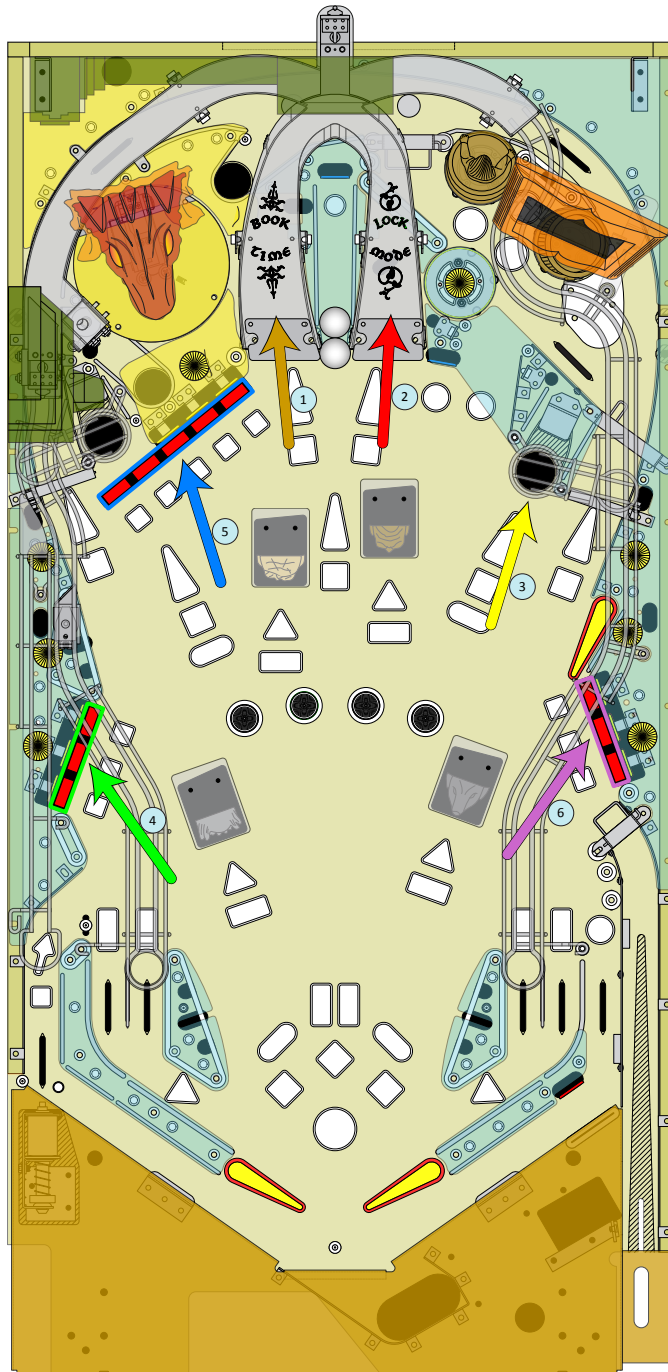
Beast Multiball

- 1) When the **Warg** inlane is lit and a ball rolls through, the **Warg** beast will pop up out of the playfield. Hit the creature to defeat it and knock it back down (red line, opposite).
- 2) When the **Orc** inlane is lit and a ball rolls through, the **Orc** beast will pop up out of the playfield. Hit the creature to defeat it and knock it back down (blue line, opposite).
- 3) When the **Goblin** inlane is lit and a ball rolls through, the **Goblin** beast will pop up out of the playfield. Hit the creature to defeat it and knock it back down (green line, opposite).
- 4) When the **Spider** inlane is lit and a ball rolls through, the **Spider** beast will pop up out of the playfield. Hit the creature to defeat it and knock it back down (violet line, opposite).
- 5) Defeat all four beasts to begin Beast Multiball (two balls). Progress in defeating the beasts is tracked/indicated with the arrow inserts in front of the beast pop-ups and in the lower, left corner of the 27" LCD (below).

The inlane lights toggle; if an inlane is not lit and a ball goes through, that inlane is lit to raise a beast the next time a ball goes through.

Hit the beast pop-ups during multiball to collect Jackpots.

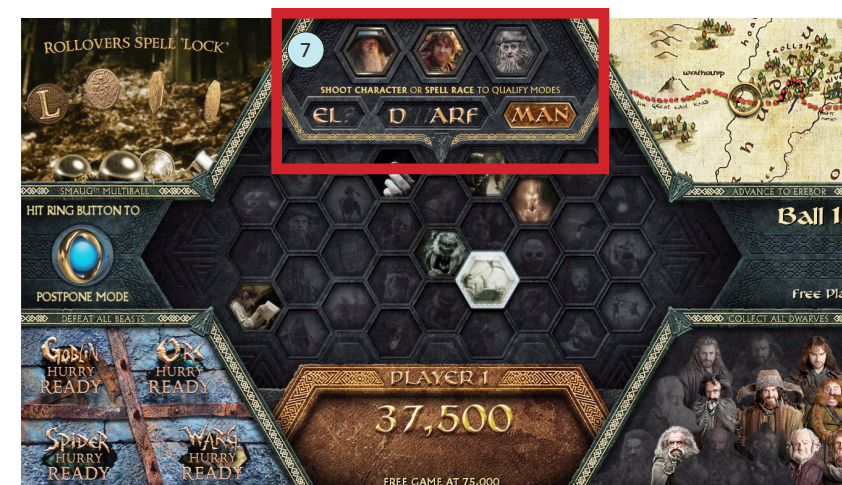


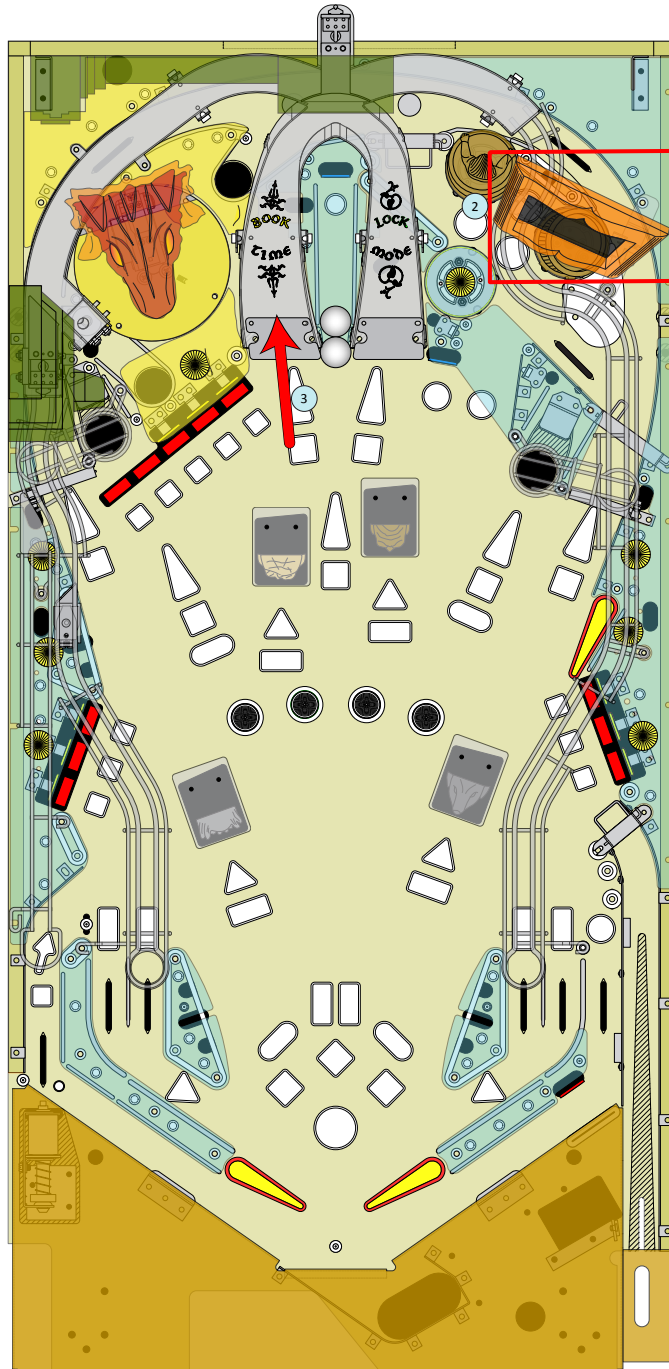


Modes - Qualifying

You qualify modes (make them available to play) by making specific shots around the play-field. Each of the 31 Hobbit modes is associated with a main character (Gandalf, Bilbo Baggins or Radagast) or a race of characters (Elf, Dwarf or Man).

- 1) Shoot the **Gandalf** (left) ramp to qualify Gandalf modes (orange arrow, opposite).
- 2) Shoot the **Bilbo Baggins** (right) ramp to qualify Bilbo Baggins modes (red arrow, opposite).
- 3) Shoot the **Radagast** (right) VUK to qualify Radagast modes (yellow arrow, opposite).
- 4) Knock down all of the **ELF** drop targets to qualify Elf modes (green arrow, opposite).
- 5) Knock down all of the **DWARF** drop targets to qualify Dwarf modes (blue arrow, opposite).
- 6) Knock down all of the **MAN** drop targets to qualify Man modes (violet arrow, opposite).
- 7) Mode qualification progress is tracked/shown in the upper, center portion of the 27" LCD screen (below). Grayed out character portraits indicate unqualified modes (**Radagast**, below); color character portraits indicate qualified modes (**Gandalf & Bilbo Baggins**, below); completed drop target banks are highlighted to indicate qualified modes (**MAN**, below).

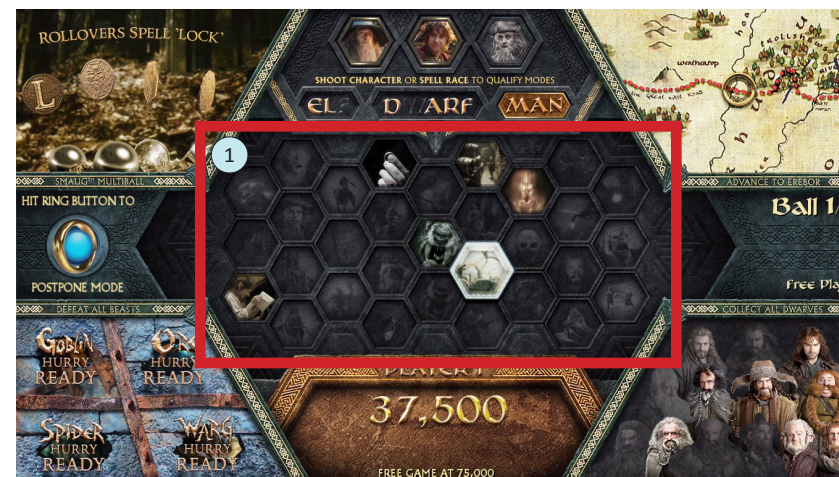


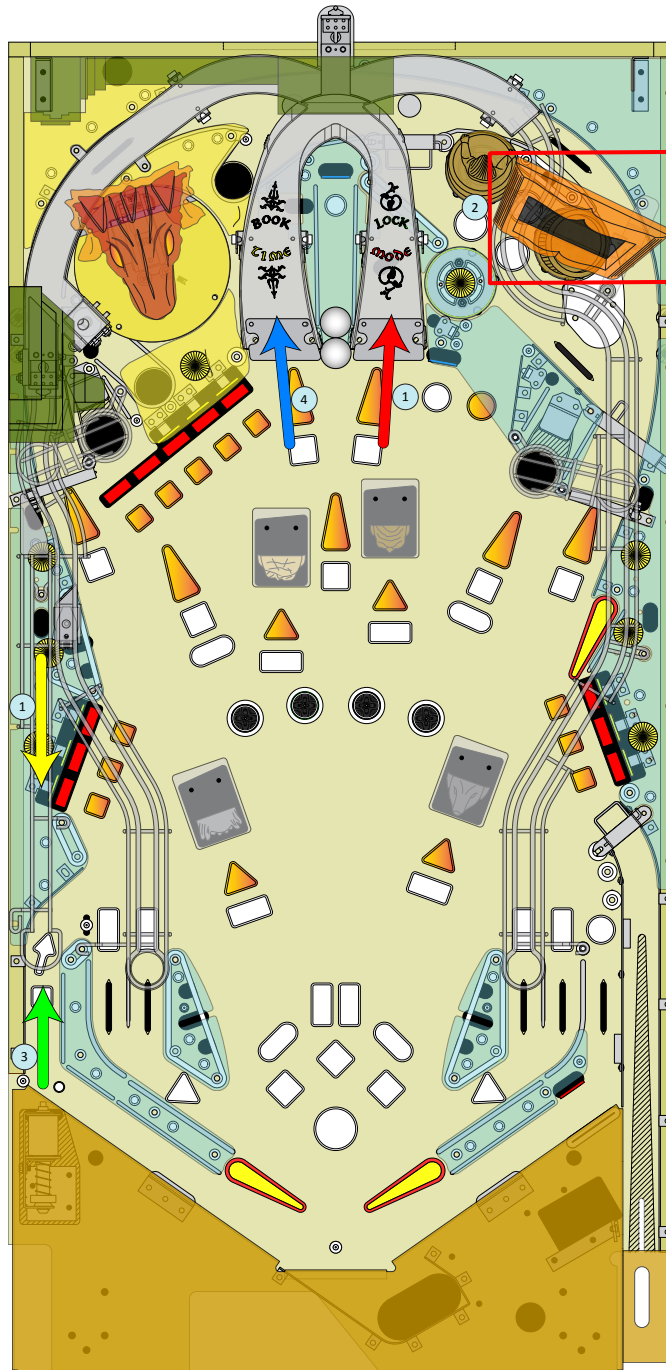


Modes - Selecting

- 1) The list of 31 Hobbit modes is shown in the center of the 27" LCD (below, left). Qualified modes are highlighted in the list. Conversely, those that have not been qualified are grayed out. The currently selected mode icon is outlined and pulsating in the list.
- 2) The name and a brief description of the currently selected mode are shown on the Book LCD, mounted in the upper, right corner of the playfield (red box, opposite & below, right).
- 3) If you wish to change the currently selected mode, shoot the **Gandalf** (left) ramp when the "**Book**" ramp cutout is lit (red arrow, opposite). A mode "page" will turn on the Book LCD (revealing the newly selected mode's name and description on the Book's screen) and the associated mode icon in the center of the 27" LCD will begin to pulsate.

Use the **Gandalf** (left) ramp as many times as necessary to choose the exact qualified mode you would like to play. You are in complete control!





Modes - Beginning & Playing

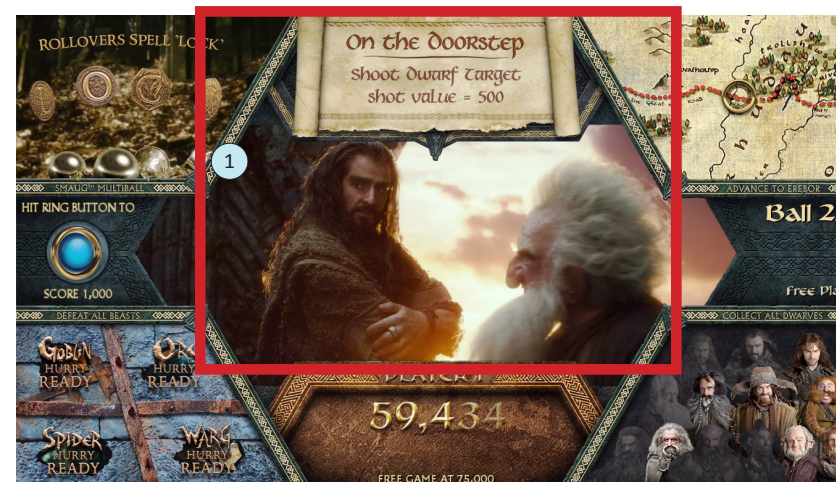
1) Shoot the **Bilbo Baggins** (right) ramp, when the “**Mode**” ramp cutout is lit (red arrow, opposite), to begin playing the currently selected game mode. The ball will be diverted (yellow arrow, opposite) from the left wire ramp to the Windlane (in the left outline), where it will be temporarily held. The center portion of the 27” LCD (below, left) will display video choreographed for the mode, along with a scroll showing its title, shot objectives and total progress (when applicable).

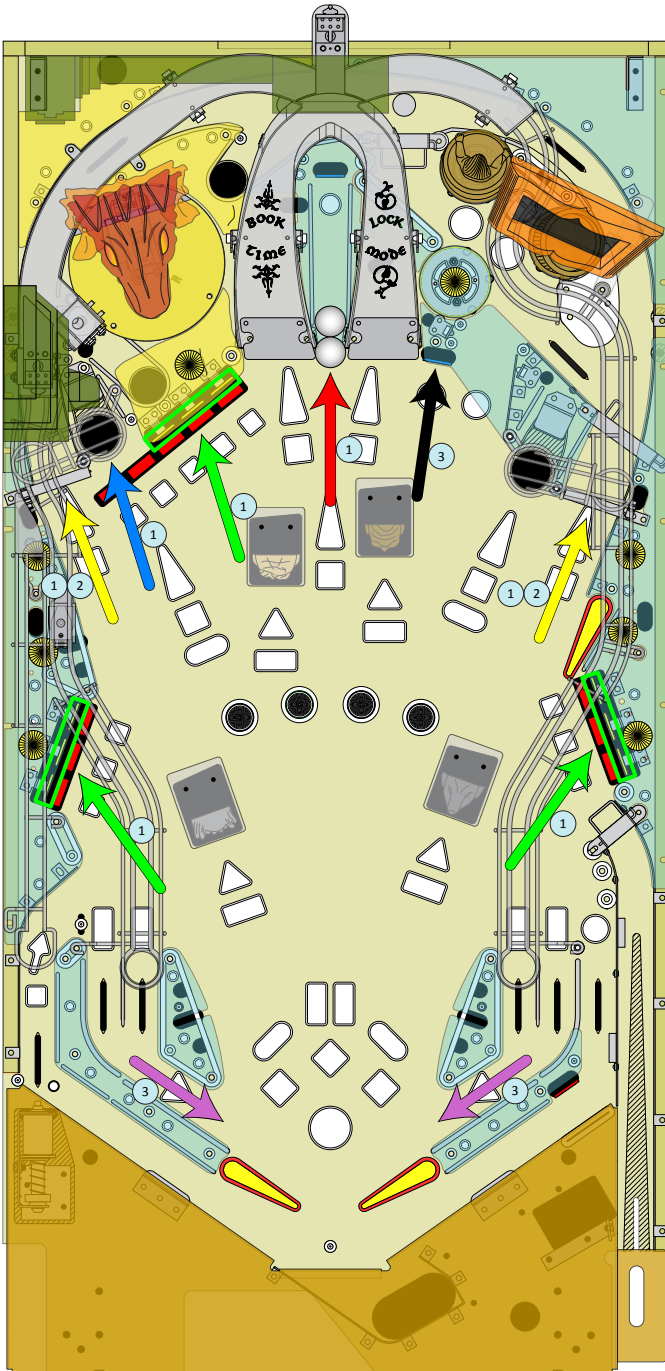
2) The Book LCD (red box, opposite & below, right) will also indicate mode shot objectives and track your progress.

3) The Windlane will fire the ball (green arrow, opposite) to formally begin the game mode. Most Hobbit modes are timed; where applicable, the timer will appear in the center of the Book LCD (below, right), counting down as the mode progresses.

4) While playing a mode, shoot the **Gandalf** (left) ramp when the “**TIME**” ramp cutout is lit (blue arrow, opposite) to add a few more seconds to the mode timer.

Inserts (highlighted in orange, opposite) will light to indicate shot objectives on the playfield. Make the flickering orange shots to rack up points and complete the mode!





Other Game Objectives & Mystery Awards!

1) Shoot the nine yellow stand-up targets, behind the drop targets (green arrows, opposite), the left VUK (blue arrow, opposite), the captive ball target (red arrow, opposite) and the two orbit spinners (yellow arrows, opposite) to collect all 13 Dwarf characters. Your progress will be tracked/indicated in the lower, left corner of the 27" LCD (below). Collected Dwarves will be highlighted; those yet to be collected will be grayed out.

2) Shoot the **Fili** (left) and **Kili** (right) orbit spinners (yellow arrows, opposite) to advance to **Erebor**. Your current location (the Ring icon) and progress toward the Lonely Mountain are displayed on a scrolling map in the upper, right corner of the 27" LCD. The more times the spinner spins, the further you move along the path!

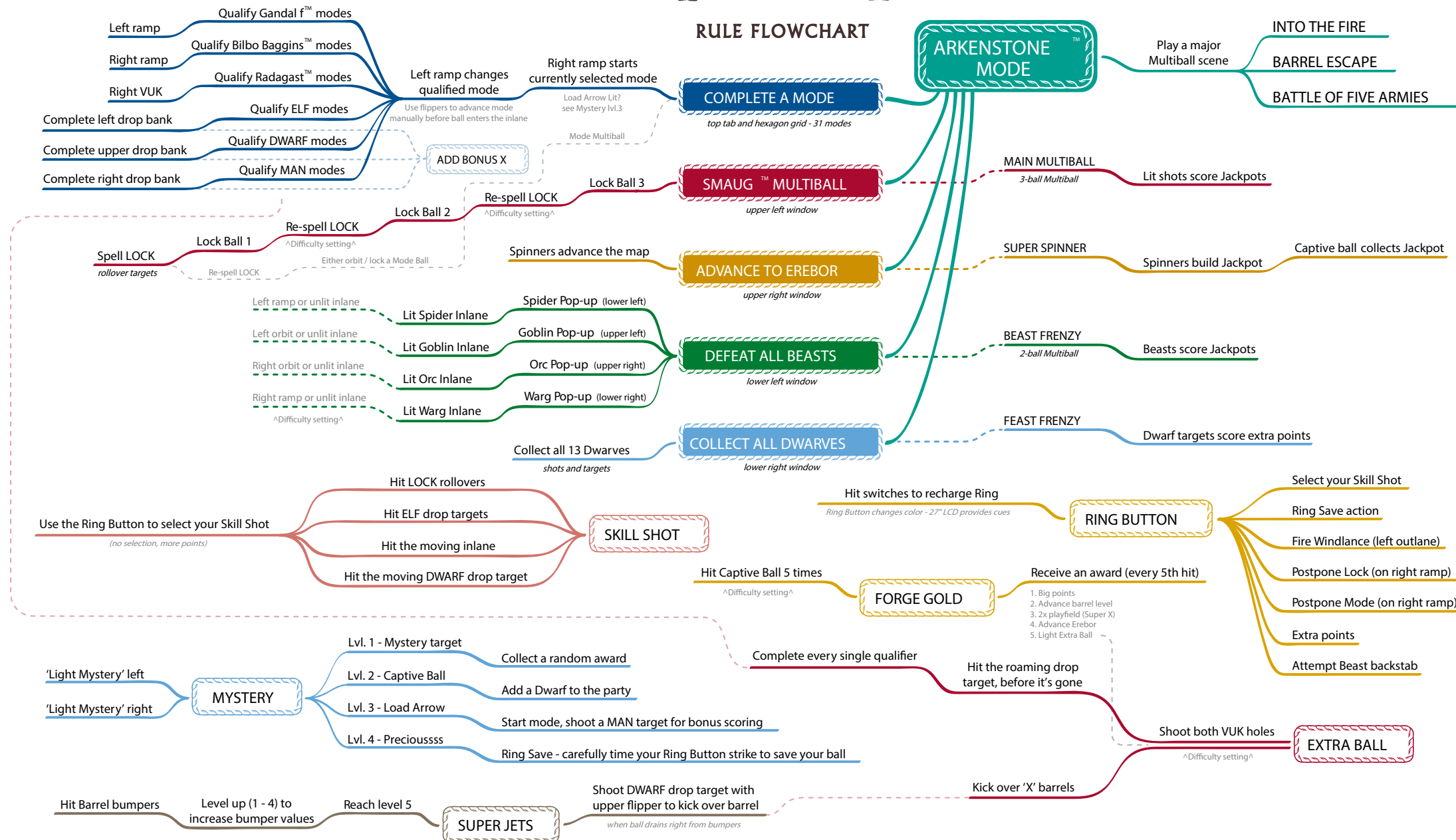
3) Spot both the left and right **Light Mystery** inlanes (violet arrows, opposite) to light the **Mystery** target. Shoot the target (black arrow, opposite), when lit, to receive a timely, helpful award. Resist the urge to hit the target and continue to spot the **Light Mystery** inlanes to unlock additional useful game features!



THE HOBBIT™

MOTION PICTURE TRILOGY

RULE FLOWCHART





Section B

The Hobbit Menu System



B.1 Menu System Basics

The Hobbit menu system allows the user or operator of the game to test the performance of its components and assemblies, personalize its rules and track, monitor or manage its play and/or earnings. Four pushbuttons are used to navigate the menu system, make adjustments, enter data, check components, trigger tests, etc. The buttons are located on the inside of the coin door, mounted to a bracket nearest its outside edge (circled in figure B1).

The buttons are labeled: black is **Enter**, red next to it is **Up/+**, next red is **Down/-** and green is **Back/Escape**. Each time you press a button, you will hear an audio response through the game's speakers. Use **Enter** to enter a sub-menu, select a menu item to change or execute a command. Use **Up/+** or **Down/-** to maneuver through menu choices or increase/decrease data values for a selected menu item. Use **Back/Escape** to exit a sub-menu or escape from a selected menu item without saving changes. Each sub-menu screen contains specific instructions for button use and/or visual cues superimposed over the button illustrations in the lower left corner of the LCD screen.

To enter the menu system at any time (after system boot-up), open the coin door and momentarily press **Enter**. The main menu screen will instantly appear on the game's LCD monitor (figure B2). The current date and time will be displayed in the lower right hand corner of the screen, along with the version of software the game is running. All of the RGB LEDs and GI/flasher LEDs in the game will light up in white to improve visibility above and below the playfield.

From the main menu screen, you can access the game's **Test Report** (if present), device/component tests, game settings, audits, utilities, presets, reports and resets. Simply move up/down in the list of menu icons, using **Up/+** and **Down/-**, then press **Enter** to select the sub-menu you'd like to access. To exit the menu system and return to game play, press **Back/Escape**. Specific details for each main menu item are included later in this section. From this screen, you can also easily jump into the **Game Presets, Difficulty Presets & Customization** menus to quickly customize your game.

Note: When the coin door is opened, the game's safety interlock switch (the upper switch on item 14, pg C-2 of this manual) disables the 70-volt power running to the playfield. In order to activate 70-volt devices in any of the diagnostics tests, you must either close the coin door or pull the safety interlock switch's actuator out (it will "click" and lock in place). When you close the coin door, the interlock switch actuator will be pushed back into its normal (unlocked) position. **CAUTION:** Most of the high power coils will be enabled, so slingshots, pop bumpers, VUKs and flippers (if activated by the flipper buttons) will kick a ball around as it rolls down the playfield - or fire when trigger switches are closed by any means. **So please be careful with your fingers and tools on the playfield surface! If you lift the playfield for any reason, please be careful around high power coil lugs, as they present a shock hazard!**

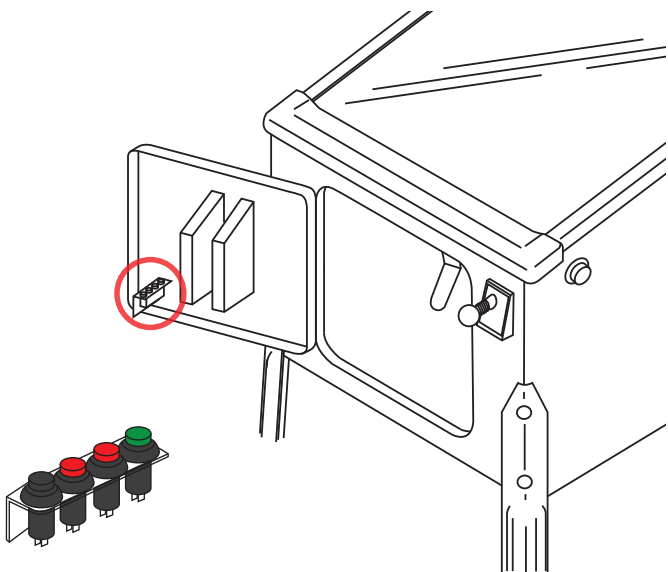


Figure B1. Menu system navigation buttons.

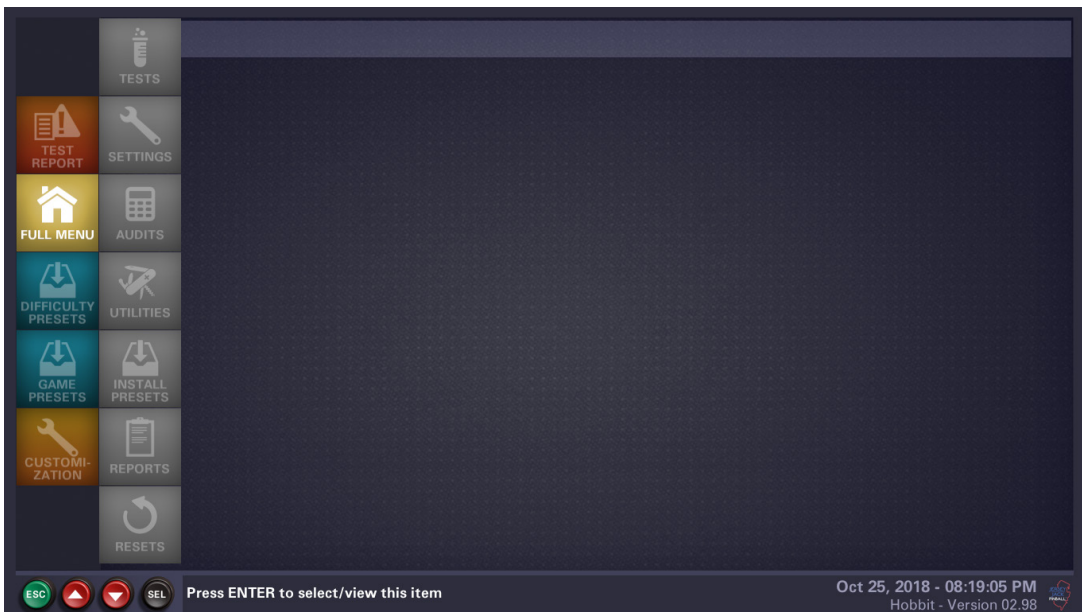


Figure B2. Hobbit menu system's main menu screen.



B.2 Tests

The **Tests** menu (see figure B3 for an outline) allows the user to test all major components and assemblies in the game for proper operation.

Switch Tests - test all matrixed or dedicated switches in the game. A screen will be displayed for the selected group (**Matrixed Switches** or **Dedicated Switches**) showing the status of every switch within the group. As you manually open or close switches, the status for each is updated on the screen and you hear an audio response through the game’s speakers. In **Single Switch** test, you can scroll through the entire list of switches and repeatedly open or close any single switch. The **Switch History** screen displays the 24 most recent inactive-to-active switch transitions.

Coils - test virtually any coil, magnet, motor or light in the game. A screen will be displayed, listing all of the coils, magnets, motors and lights in the game that can be energized. You can auto-cycle through the list one at a time, or repeatedly/manually trigger a single device.

LED Tests - test the RGB LEDs in the game (feature and GI lighting). **Ordered LED Test** - you can step through the list of RGB LEDs, one at a time, in hardware order, and test the color-producing capability of each. **Grouped LED Test** - you can step through the list of RGB LEDs, one at a time, in grouped order, and test the color-producing capability of each. **Rev Order LED Test** - basically the same as the **Ordered LED Test**, except the LEDs are listed in reverse hardware order. **All LED Test** - all LEDs (RGB and GI) will light at once, allowing you to test the color-producing capability of the entire chain at one time. **GI Only Test** - allows you to test the color-producing capability of LEDs used for GI purposes. **LED And Flash Test** - allows you to test the functionality of all CPU-controlled lighting in the game at one time.

Display - test the basic colors and alignment of images on the game’s LCD monitor. You can step through several fundamental colors on the screen and superimpose a grid on it to check for proper centering and alignment of displayed images.

Sound - test the game’s sound system for proper balance and operation with sound effects, voices, music and a wide variety of tones and sweeps.

Device Tests - test all of the major game devices/assemblies (**Ball Trough, Pop-Up Mechanisms, Drop Target Banks, & Dragon (Smaug)**) for proper operation. A specific screen will be displayed for each device, allowing the user to repeatedly exercise it and ensure that it is functioning correctly.

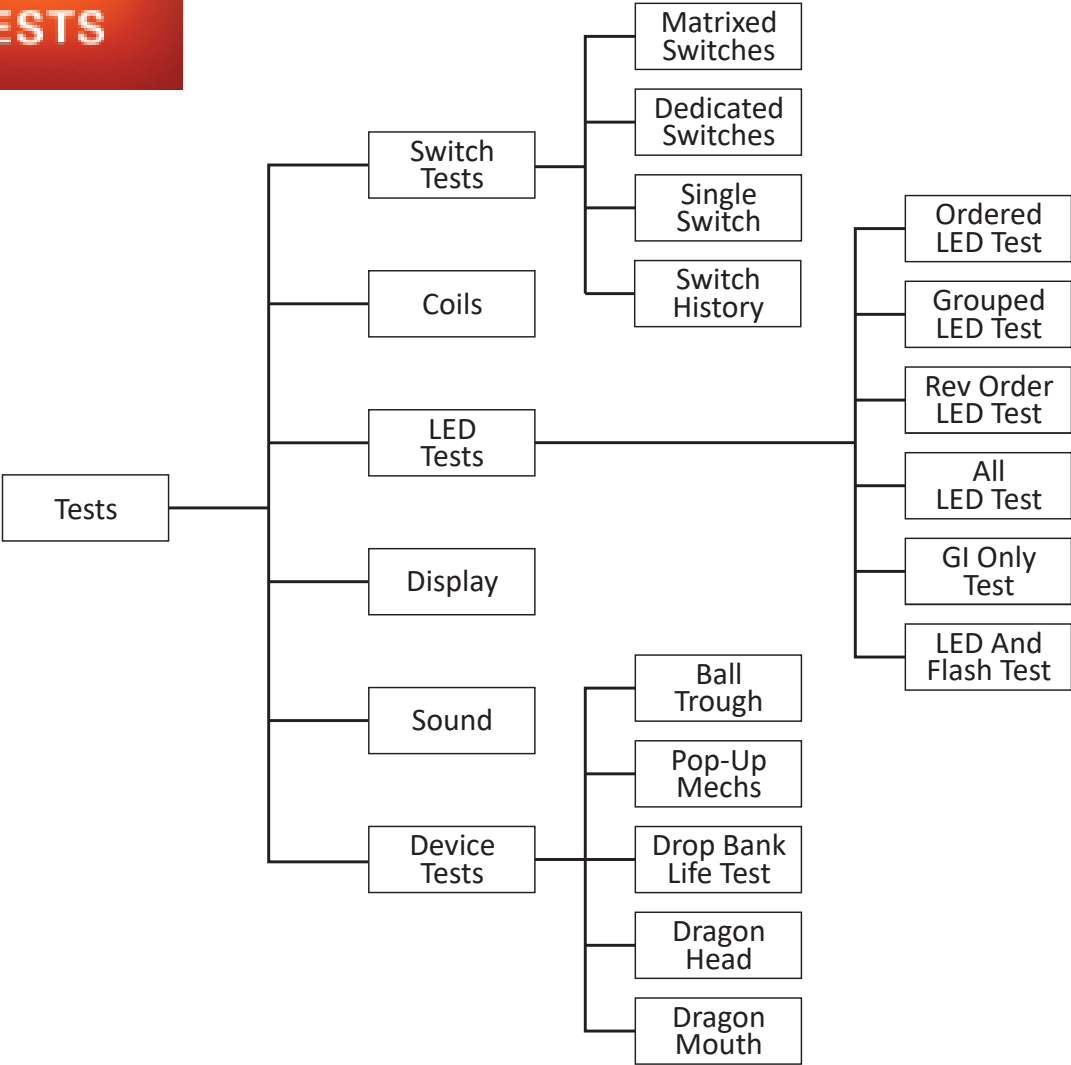


Figure B3. Tests menu tree.



Matrixed Switch Test

When you enter the **Matrixed Switch Test**, the LCD monitor will display the screen shown in figure B4. A window highlighting locations/states of switches on the game’s playfield (at right in figure B4) can be toggled on and off by pressing the **Start** button on the front of the cabinet. The playfield window can be moved to the center or right side of the screen by using the **Up/+** or **Down/-** buttons. Each square in the playfield window corresponds to a matrixed switch. The color of the square (in both the playfield window and the matrix itself) represents the current state of that switch.

Active switches, regardless of their type, are displayed in bright green squares. Inactive opto switches are displayed in light tan (if normally unblocked) or dark tan (if normally blocked) squares; all other inactive switches are displayed in bright blue (if normally open) or navy blue (if normally closed) squares. Bad switches (switches that have been inactive for approximately 60 balls played) are displayed in red squares. Unused positions in the matrix are represented by gray squares; any unused position that is registering active (an error) is represented by a brown square.

The driver (column) and return (row) numbers for each switch, along with corresponding wire colors and I/O Board connector/pin numbers, are shown at the top and left side of the screen, respectively.

You can simultaneously test as many switches as you like, or repeatedly test a single switch, observing the results in the matrix and/or the playfield window. The game also provides an audible response each time the state of a switch changes. Note: When adjusting a switch, the best method for testing it is to roll a pinball over it, through it or into it.

To exit the **Matrixed Switch Test** at any time, press the **Back/Escape** button.

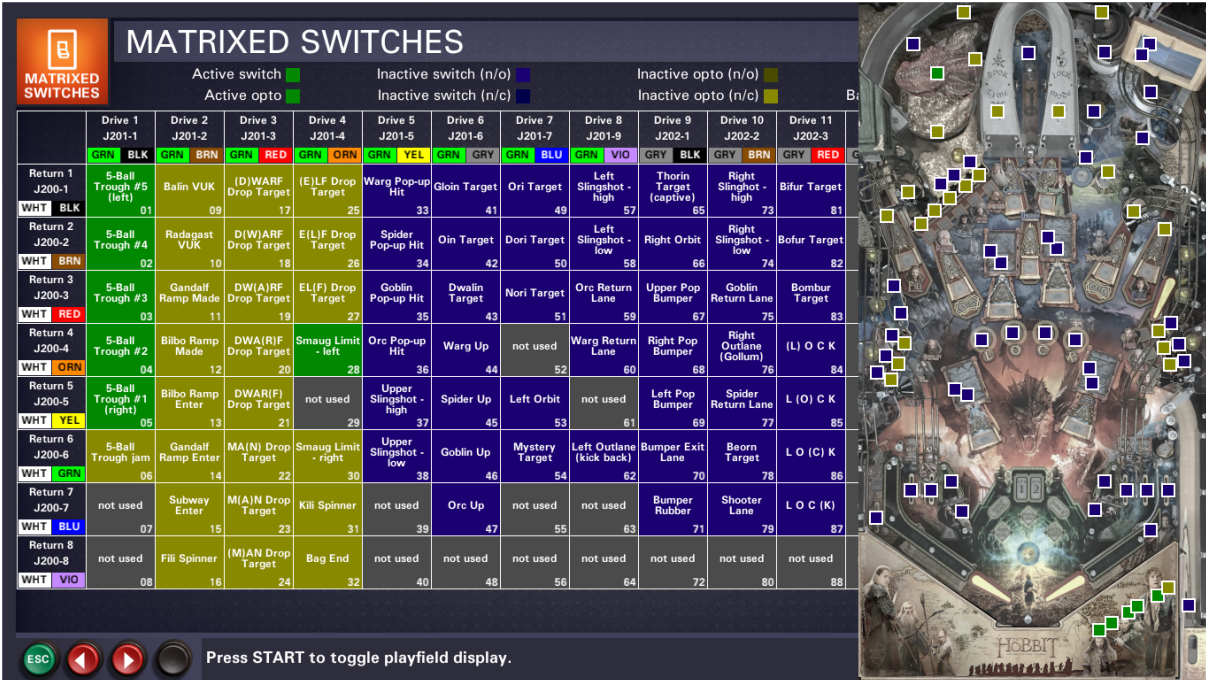


Figure B4. Matrixed Switch Test screen.



Dedicated Switch Test

When you enter the **Dedicated Switch Test**, the LCD monitor will display the screen shown in figure B5. The four dedicated switch strings are shown, grouped by their common ground wire. Each square in each string corresponds to a specific switch; the color of the square represents the current state of that switch.

Active switches, regardless of their type, are displayed in bright green squares. Inactive opto switches are displayed in light tan (if normally unblocked) or dark tan (if normally blocked) squares; all other inactive switches are displayed in bright blue (if normally open) or navy blue (if normally closed) squares. Bad switches (switches that have been inactive for approximately 60 balls played) are displayed in red squares. Unused positions in the matrix are represented by gray squares; any unused position that is registering active (an error) is represented by a brown square.

Wire colors and I/O Board connector/pin numbers are shown for each string of switches.

You can simultaneously test as many switches as you like, or repeatedly test a single switch, observing the results on the screen. The game also provides an audible response each time the state of a switch changes.

To exit the **Dedicated Switch Test** at any time, press the *Back/Escape* button.

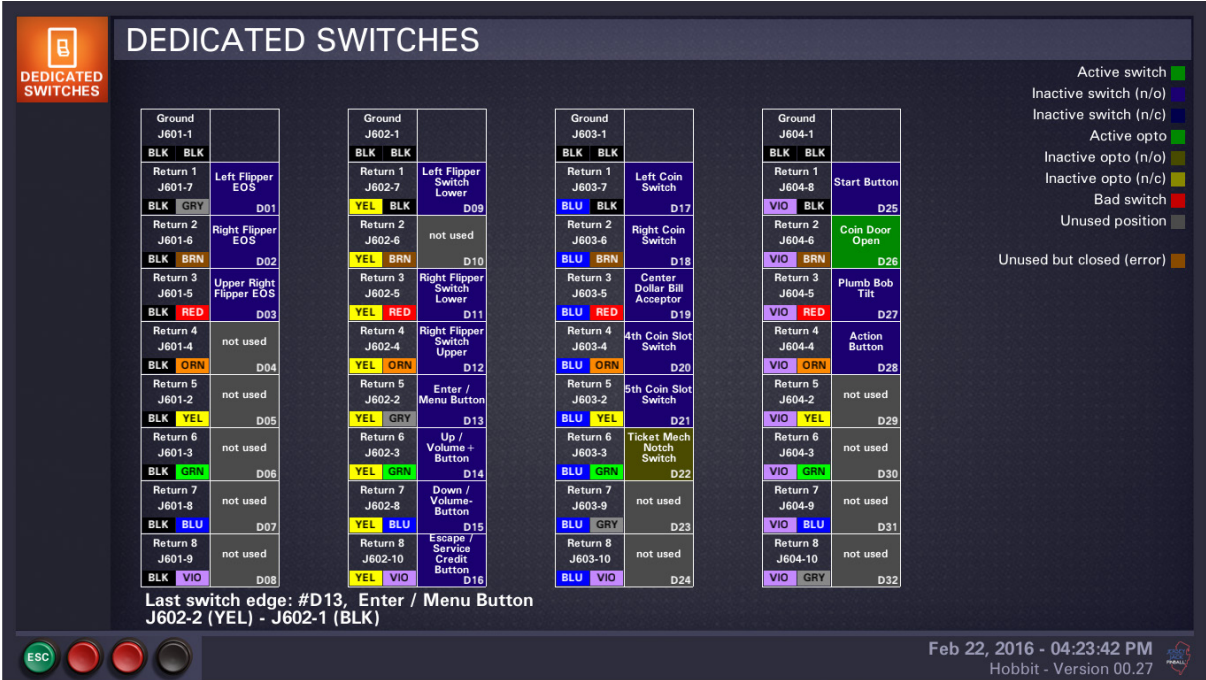


Figure B5. Dedicated Switch Test screen.



Single Switch Test

When you enter the **Single Switch Test**, the LCD monitor will display the screen shown in figure B6. The entire list of dedicated and matrixed switches is shown alongside a window highlighting the location/state of the currently selected switch on the game’s playfield (at right in figure B6). The switch is displayed as a small, blinking square; the color of the square represents its current state.

An active switch, regardless of its type, is displayed as a bright green square. An inactive opto switch is displayed as a light tan (if normally unblocked) or dark tan (if normally blocked) square; any other inactive switch is displayed as a bright blue (if normally open) or navy blue (if normally closed) square. A bad switch (a switch that has been inactive for approximately 60 balls played) is displayed as a red square. Unused positions in the matrix are not displayed in the playfield window.

All switch driver (column) and return (row) numbers are shown, along with corresponding wire colors and I/O Board connector/pin numbers.

You can scroll through the list of matrixed switches, using the **Up/+** and **Down/-** buttons, and select any switch to test. You can then repeatedly open or close the selected switch, observing the results in the playfield window. The game also provides an audible response each time the state of the switch changes. Note: When adjusting a switch, the best method for testing it is to roll a pinball over it, through it or into it.

To exit the **Single Switch Test** at any time, press the **Back/Escape** button.



Figure B6. Single Switch Test screen.



Switch History Test

When you enter the **Switch History Test**, the LCD monitor will display the screen shown in figure B7. A list of the 24 most recent dedicated and/or matrixed switch inactive-to-active transitions is shown alongside a window depicting the game’s playfield (at right in figure B7).

All switch driver (column) and return (row) numbers are shown, along with corresponding wire colors and I/O Board connector/pin numbers.

You can clear the **Switch History Test** listing by pressing the *Enter* button.

To exit the **Switch History Test** screen at any time, press the *Back/Escape* button.

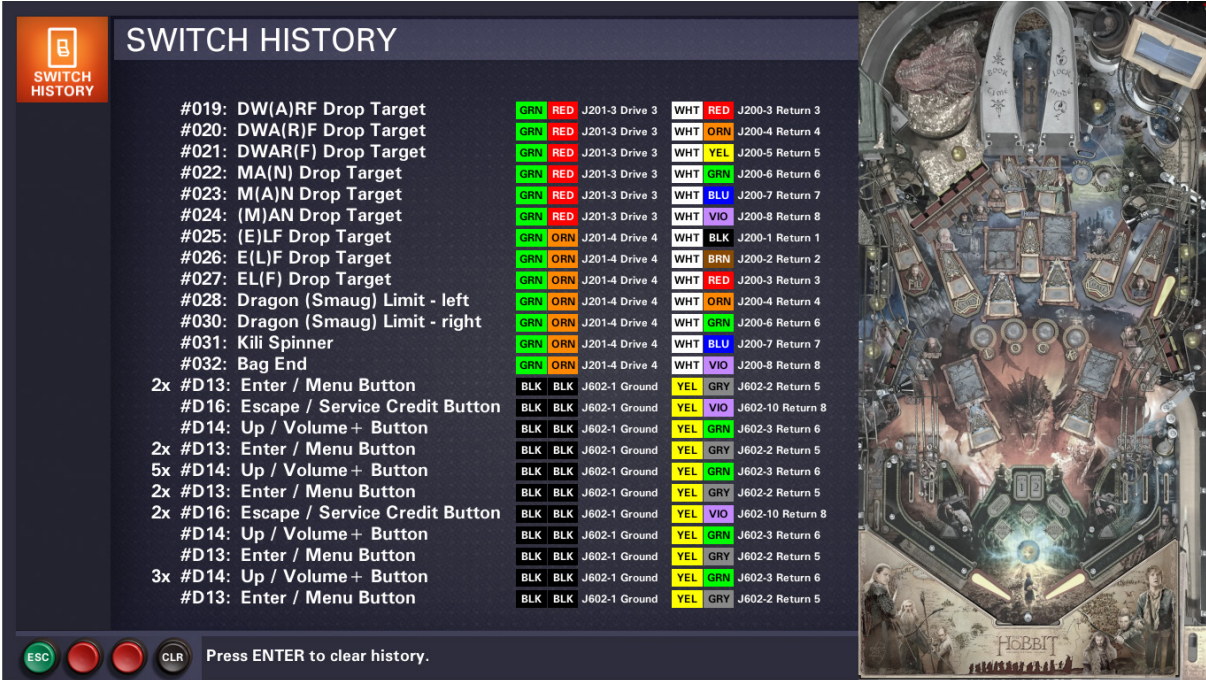


Figure B7. Switch History Test screen.



Coils Test

When you enter the **Coils Test**, the LCD monitor will display the screen shown in figure B8. The entire list of coils, magnets, motors and lights is shown alongside a window highlighting the location of the currently selected device on the game’s playfield (at right in figure B8). The device is displayed as a small, white, blinking square. Note: Devices in the list that cannot be activated in the **Coils Test** are highlighted in blue text (these devices have their own specific tests).

Coil number, power/trigger wire colors, I/O Board connectors/pins, drive transistor, in-line fuses and supply voltage level are provided for each device in the list.

There are three different modes for triggering a device: **RUNNING**, **REPEAT** and **MANUAL**. The current mode is highlighted in green text at the top of the screen; you change the current mode by pressing the **Enter** button. In **RUNNING** mode, the game automatically cycles through the list, triggering each device once. In **REPEAT** mode, you scroll through the list (using the **Up/+** and **Down/-** buttons) and select a specific device; the game then repeatedly triggers it. In **MANUAL** mode, you select a specific device in the list and trigger it yourself using the **Start** button on the front of the cabinet.

Note: When the coin door is opened, the game’s safety interlock switch (the upper switch on item 14, page C-2 of this manual) disables the 70-volt power running to the playfield. In order to activate 70-volt devices in the **Coils Test**, you must either close the coin door or pull the safety interlock switch’s actuator out (it will “click” and lock in place). When you close the coin door, the interlock switch actuator will be pushed back into its normal (unlocked) position.

To exit the **Coils Test** at any time, press the **Back/Escape** button.

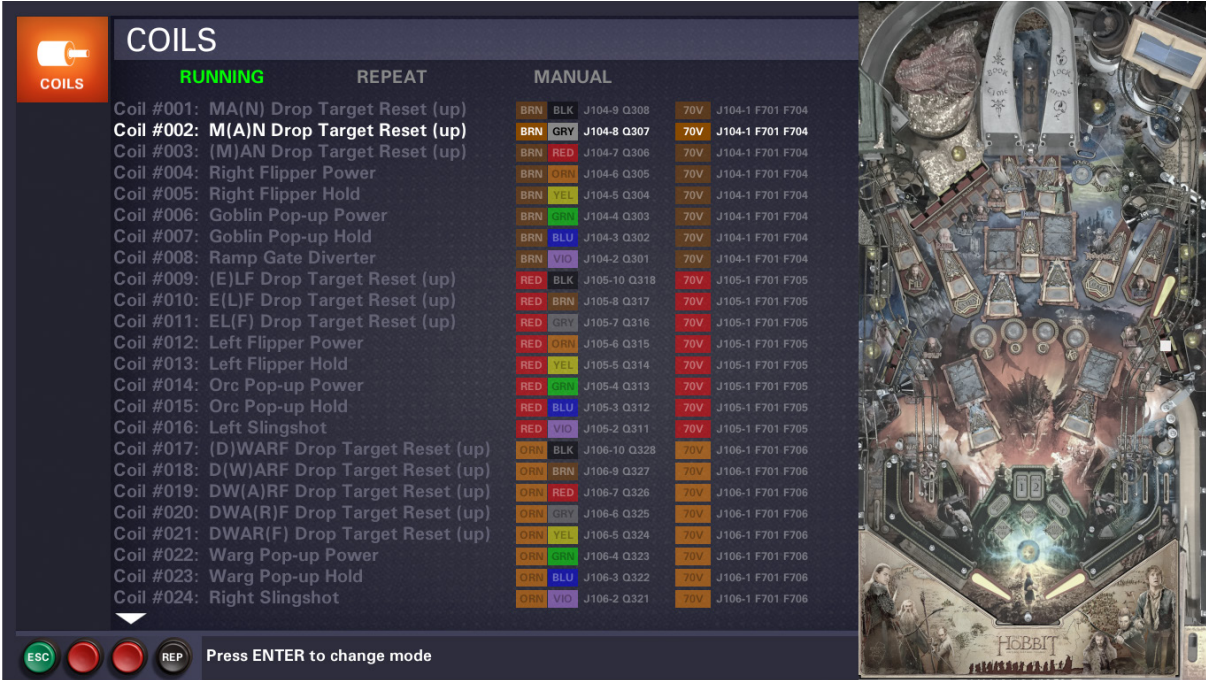


Figure B8. Coils Test screen.



Ordered LED Test

When you enter the **Ordered LED Test**, the LCD monitor will display the screen shown in figure B9. The entire list of RGB LEDs is shown alongside a window highlighting the location of the currently selected LED on the game's playfield (at right in figure B9). The LED is represented in the window by a small, white, blinking circle, while the actual LED flashes on the playfield.

Initially, the selected LED flashes the color white. You can change the color to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. You can scroll through the list of LEDs using the **Up/+** and **Down/-** buttons.

For this test, the RGB LEDs are listed in hardware order (the order that the RGB LED boards are physically connected to controller boards, under the playfield). In this regard, the Hobbit's RGB LED string can be considered one long chain. The **Ordered LED Test** allows you to step through and test this entire chain, one LED at a time.

To exit the **Ordered LED Test** at any time, press the **Back/Escape** button.

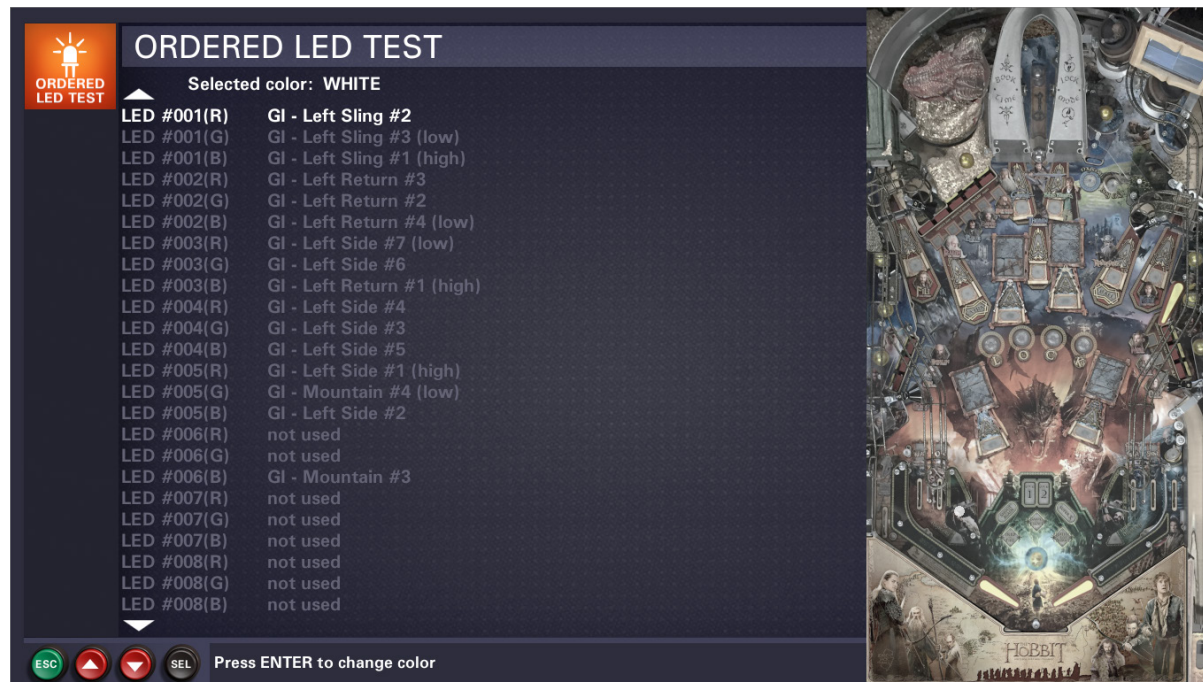


Figure B9. Ordered LED Test screen.



Grouped LED Test

When you enter the **Grouped LED Test**, the LCD monitor will display the screen shown in figure B10. The entire list of RGB LEDs is shown alongside a window highlighting the location of the currently selected light on the game’s playfield (at right in figure B10). The light is displayed in the window as a small, white, blinking circle while the actual LED flashes on the playfield.

Initially, the selected LED flashes the color white. You can change the color to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. You can scroll through the list of LEDs using the **Up/+** and **Down/-** buttons.

For this test, the RGB LEDs are listed in logical/grouped order. The Hobbit’s RGB LED string is one long chain. The **Grouped LED Test** allows you to step through and test the entire string of RGB LEDs, in groups (L, O, C, and K rollovers), in logical order (words spelled in order), as they are associated on the playfield. The test begins with the LEDs in the lowest portion of the main playfield and progresses upward.

To exit the **Grouped LED Test** at any time, press the **Back/Escape** button.

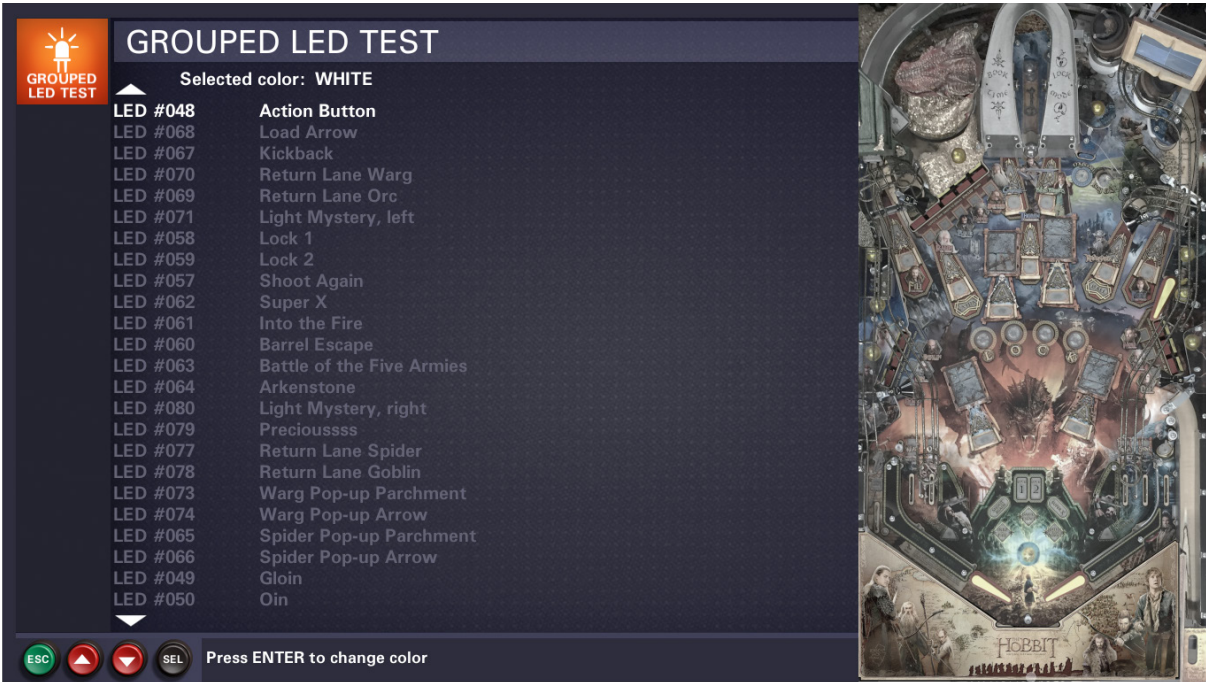
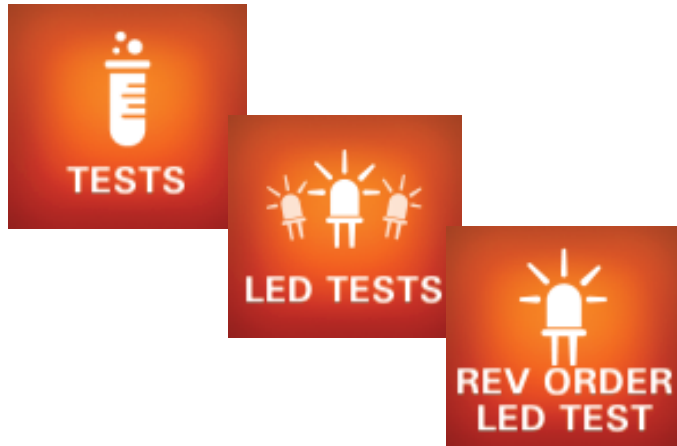


Figure B10. Grouped LED Test screen.



Reverse Order LED Test

When you enter the **Reverse Order LED Test**, the LCD monitor will display the screen shown in figure B11. The entire list of RGB LEDs is shown alongside a window highlighting the location of the currently selected LED on the game's playfield (at right in figure B11). The LED is represented in the window by a small, white, blinking circle, while the actual LED flashes on the playfield.

Initially, the selected LED flashes the color white. You can change the color to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. You can scroll through the list of LEDs using the **Up/+** and **Down/-** buttons.

For this test, the RGB LEDs are listed in reverse hardware order (the reverse order that the RGB LED boards are physically connected to controller boards, under the playfield). The **Reverse Order LED Test** allows you to step through and test this entire chain, in reverse order, one LED at a time.

To exit the **Reverse Order LED Test** at any time, press the **Back/Escape** button.

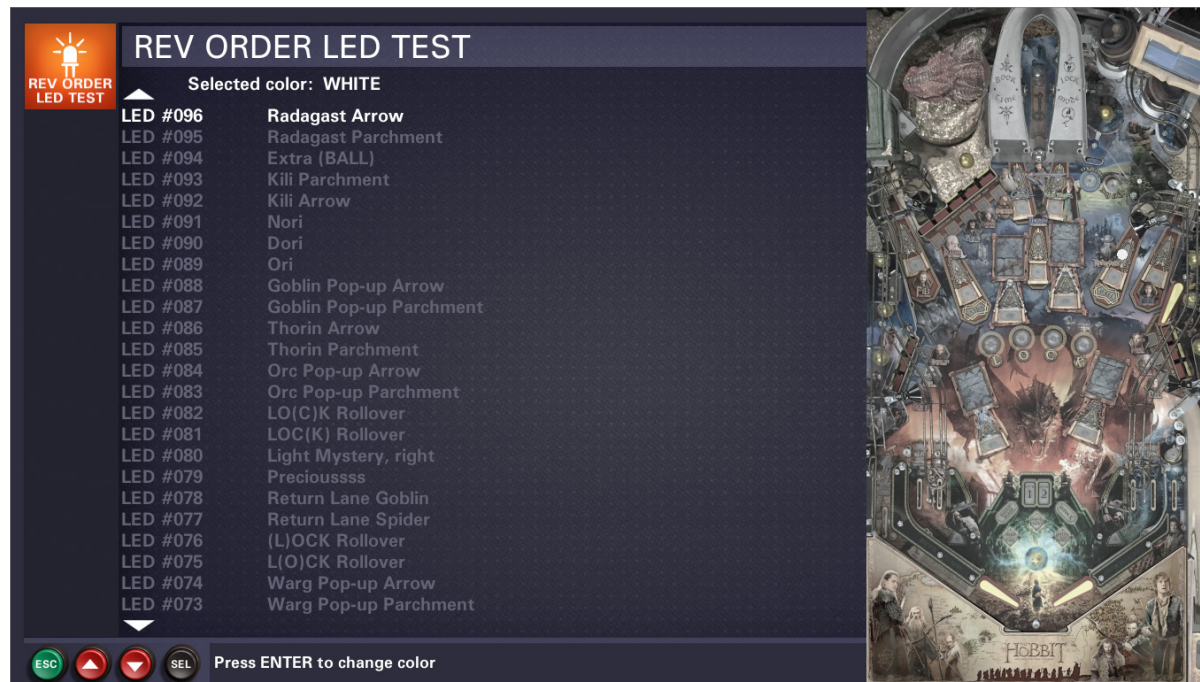


Figure B11. Reverse Order LED Test screen.



All LED Test

When you enter the **All LED Test**, the LCD monitor will display the screen shown in figure B12. The entire chain of RGB LEDs is lit at once. Initially, the LEDs are white and not flashing. You can change the color to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. Press either the **Up/+** or **Down/-** button to toggle the LED string between flashing and constant-on.

To exit the **All LED Test** at any time, press the **Back/Escape** button.



Figure B12. All LED Test screen.



GI Only Test

When you enter the **GI Only Test**, the LCD monitor will display the screen shown in figure B13. All LEDs used for general illumination are lit at once. Initially, the LEDs are white and not flashing. If the GI LEDs were RGB, you could change the color to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. However, all versions of Hobbit games use cool white GI LEDs (no RGB), so they remain white, regardless of what color is selected on the LCD screen. Press either the **Up/+** or **Down/-** button to toggle the GI LEDs between flashing and constant-on.

To exit the **GI Only Test** at any time, press the **Back/Escape** button.

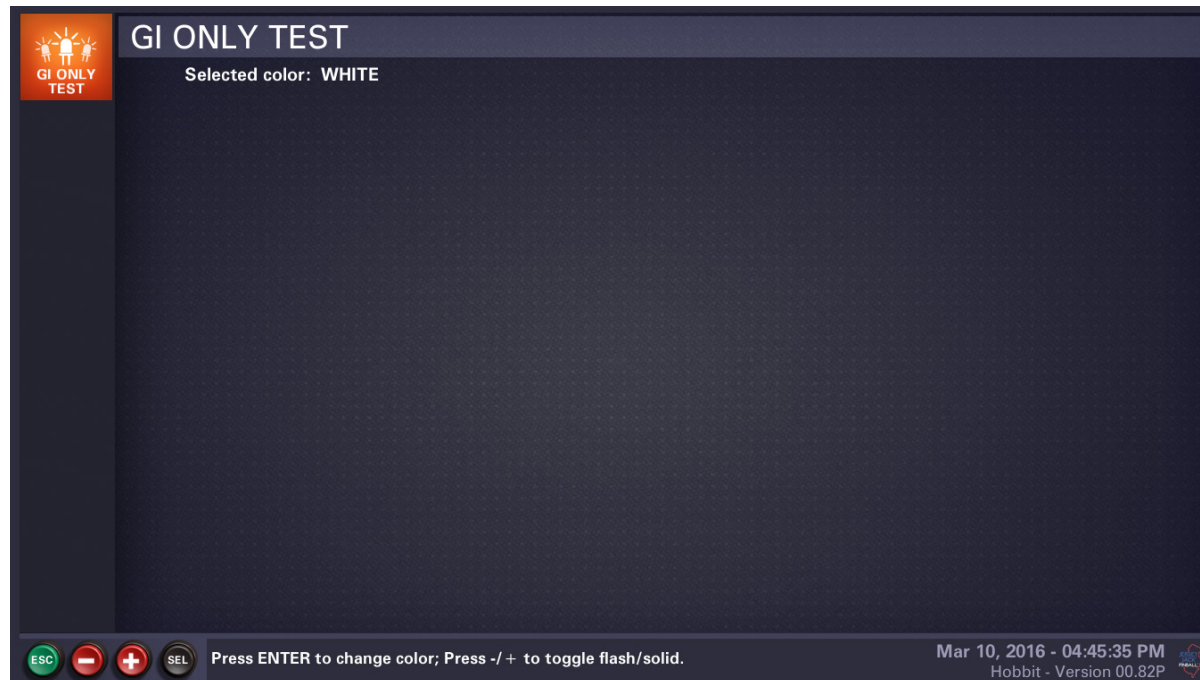


Figure B13. GI Only Test screen.



LED And Flash Test

When you enter the **LED And Flash Test**, the LCD monitor will display the screen shown in figure B14. All RGB LEDs and GI LEDs are lit at once. All CPU-controlled lights (spotlights, pop bumper light, etc.) are flashing. Initially, the RGB and GI LEDs are white and not flashing. You can change the color of the RGB LEDs to red, green, blue and back to white by repeatedly pressing the **Enter** button. The current color will be displayed at the top of the screen. Press either the **Up/+** or **Down/-** button to toggle the RGB and GI LEDs between flashing and constant-on.

To exit the **LED And Flash Test** at any time, press the **Back/Escape** button.



Figure B14. LED And Flash Test screen.



Display Test

When you enter the **Display Test**, the LCD monitor will display an edge-to-edge red screen, as shown at left in figure B15. You can change the full-screen color to green, blue then white by pressing the **Up/+**, **Down/-** or **Enter** button three times. Pressing one of these buttons again will fill the screen with a white grid against a black background; once more will change the grid to black against a white background.

The color screens allow you to test the LCD monitor's color saturation performance, from edge to edge. The grids allow you to test image alignment on the monitor.

To exit the **Display Test** at any time, press the **Back/Escape** button.

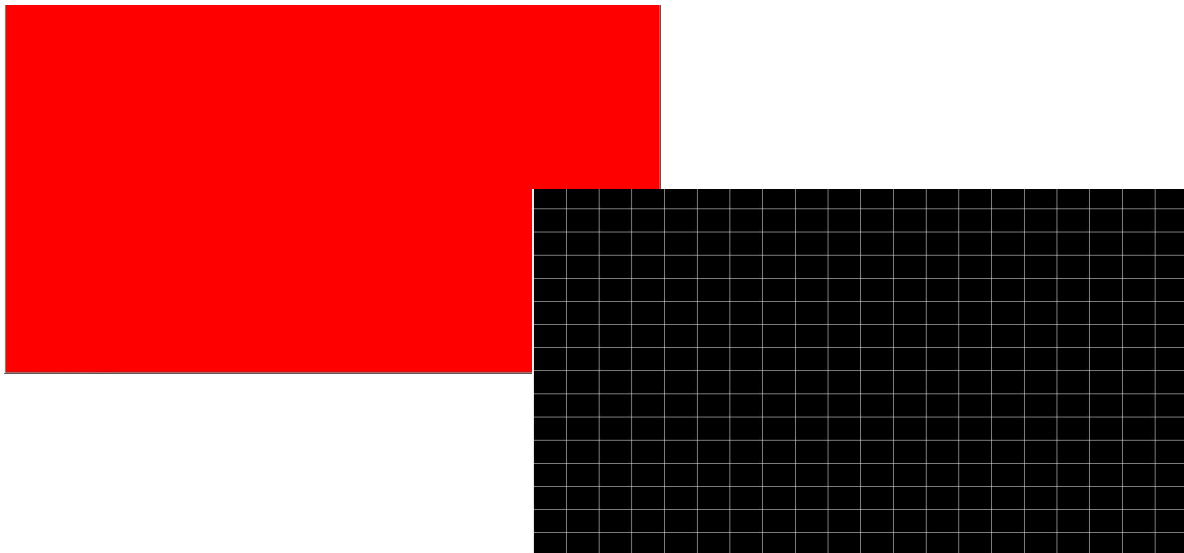
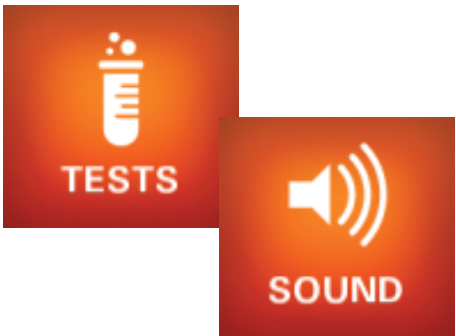


Figure B15. Display Test screens.



Sound Test

When you enter the **Sound Test**, the LCD monitor will display the screen shown in figure B16. The list of programmed test sounds is displayed.

There are three different modes for testing sounds: **RUNNING**, **REPEAT** and **MANUAL**. The current mode is highlighted in green text at the top of the screen; you change the current mode by pressing the **Enter** button. In **RUNNING** mode, the game automatically cycles through the list, playing each sound once. In **REPEAT** mode, you scroll through the list (using the **Up/+** and **Down/-** buttons) and select a specific sound; the game then repeatedly plays it. In **MANUAL** mode, you select a specific sound in the list and trigger it yourself using the **Start** button on the front of the cabinet.

To exit the **Sound Test** at any time, press the **Back/Escape** button.

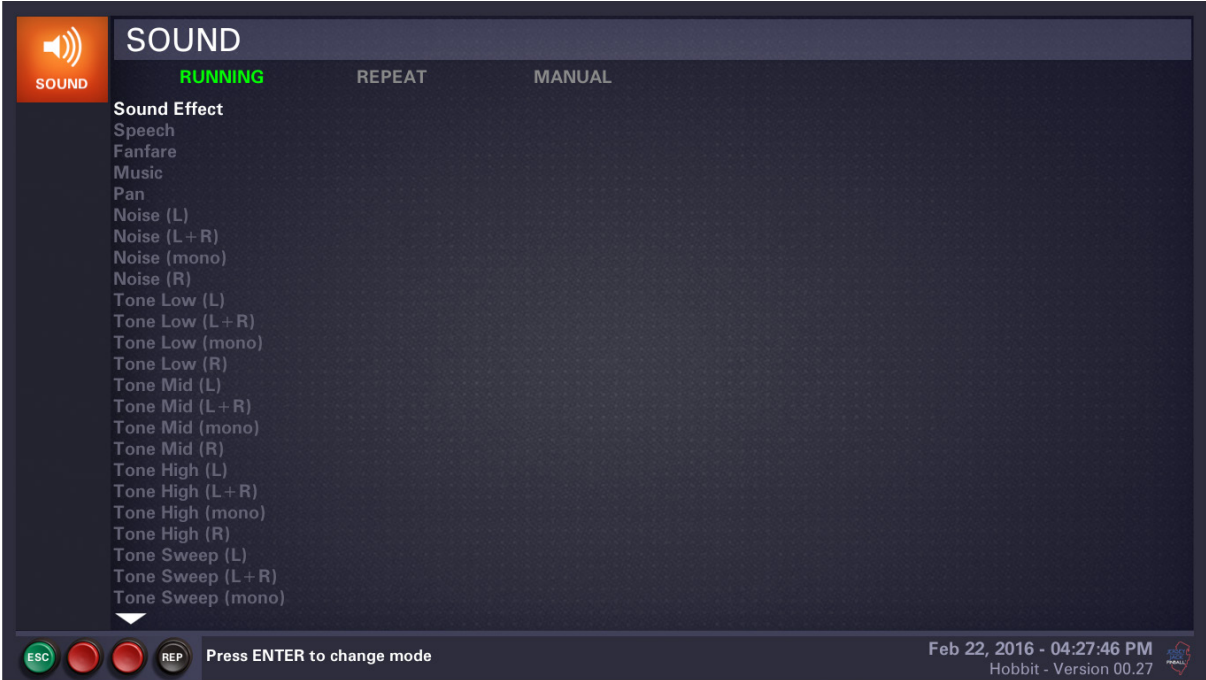


Figure B16. Sound Test screen.



Ball Trough Test

When you enter the **Ball Trough Test**, the LCD monitor will display the screen shown in figure B17. The squares on the screen represent the current states of the six opto switch transmitter/receiver pairs in the ball trough mechanism, under the lower part of the playfield. There are five opto switches in the bottom of the trough (labeled “#1” to “#5”) and one higher, in the neck of the trough VUK (labeled “jam”). A green square represents a blocked opto switch, typically caused by a ball in that position in the trough. A light tan square represents an unblocked opto switch (no ball in that position). For reference, corresponding matrixed switch numbers are shown under each square.

You can use the **Enter** button to fire the trough VUK. The rightmost ball in the trough will be kicked into the shooter lane, then Auto-Launched up the playfield. Most of the high power coils will be enabled, so slingshots, pop bumpers, VUKs and flippers (if activated by the flipper buttons) will kick a ball around as it rolls down the playfield - so **be careful with your fingers!** You can empty the trough, one ball at a time (catching each one before it returns to the trough), and test all of the opto switches in the process.

Note: When the coin door is opened, the game’s safety interlock switch (the upper switch on item 14, page C-2 of this manual) disables the 70-volt power running to the playfield. To allow coils to function in the **Ball Trough Test**, you must either close the coin door or pull the safety interlock switch’s actuator out (it will “click” and lock in place). When you close the coin door, the interlock switch actuator will be pushed back into its normal (unlocked) position.

To exit the **Ball Trough Test** at any time, press the **Back/Escape** button.

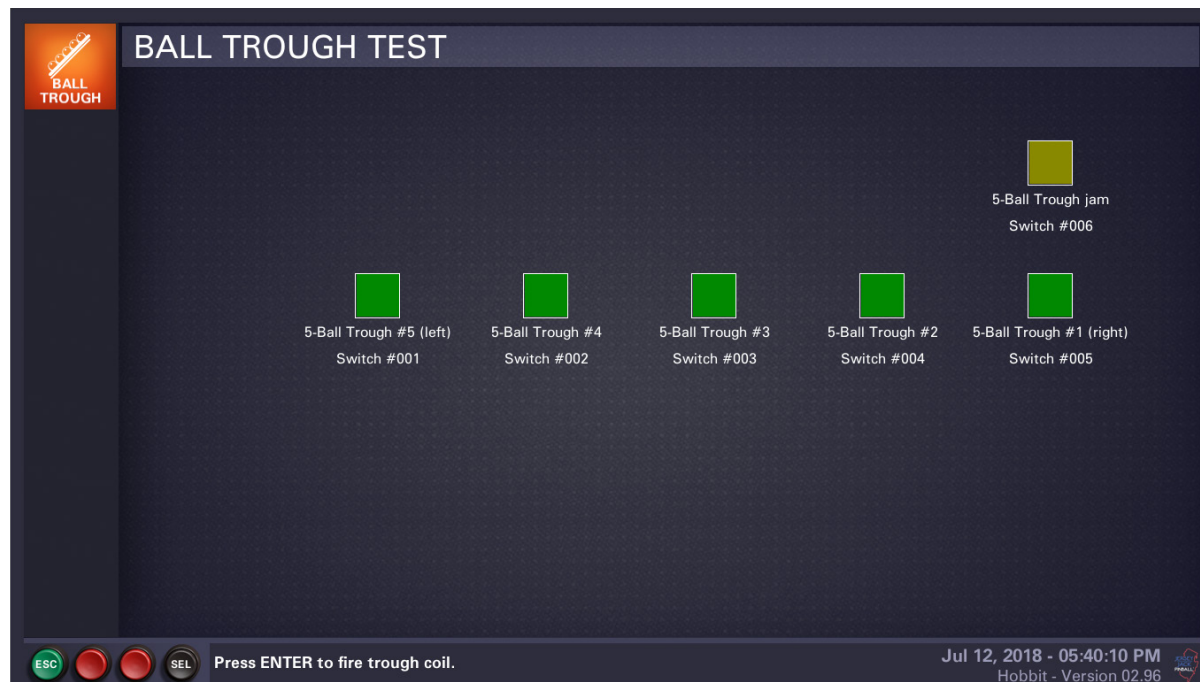
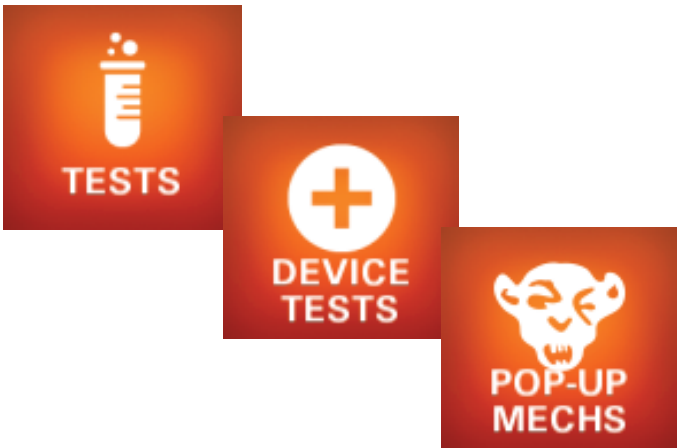


Figure B17. Ball Trough Test screen.



Pop-Up Mechanisms Test

When you enter the **Pop-Up Mechanisms Test**, the LCD monitor will display the screen shown in figure B18. The rectangles on the screen represent the current states of the four pop-up mechanisms, in the center area of the playfield. A light tan rectangle represents a pop-up mechanism in the raised position (above playfield level); a dark tan rectangle represents a pop-up mechanism in the lowered position (below playfield level); a red rectangle represents a "broken" pop-up mechanism (it failed to respond to several attempts to raise it). For reference, corresponding coil numbers and matrixed switch numbers are shown under each rectangle. Green text indicates the coil or switch is active; white text indicates that the coil or switch is inactive.

You can use the **Enter** button to toggle the position (raised or lowered) of each pop-up mechanism. When you raise a pop-up mechanism, a new rectangle appears on top of the first one. This rectangle turns blue when the pop-up's hit switch (behind the face) is closed; when the switch is open, the rectangle remains transparent.

Note: When the coin door is opened, the game's safety interlock switch (the upper switch on item 14, page C-2 of this manual) disables the 70-volt power running to the playfield. To allow coils to function in the **Pop-Up Mechanisms Test**, you must either close the coin door or pull the safety interlock switch's actuator out (it will "click" and lock in place). When you close the coin door, the interlock switch actuator will be pushed back into its normal (unlocked) position.

To exit the **Pop-Up Mechanisms Test** at any time, press the **Back/Escape** button.



Figure B18. Pop-Up Mechanisms Test screen.



Drop Bank Life Test

When you enter the **Drop Bank Life Test**, the LCD monitor will display the screen shown in figure B19. A table is shown, showing up and down counts, up and down failures and the date/time of the last up event for all of the drop targets in the game, separated by target bank.

You can use the **Enter** button to start or pause the life test. The test is initially paused (indicated in the lower left corner of the screen). When running, the life test repeatedly cycles through three different sub-tests (listed in the lower left corner of the screen); the currently running sub-test is highlighted in yellow.

During the first sub-test, each target is individually reset (up), beginning with the **E** target, moving left to right around the playfield. When the last target (**N**) is up, each target is individually retracted (down), in the same order, again beginning with the **E** target.

During the second sub-test, each target is individually reset (up), then retracted (down), beginning with the **E** target, moving left to right around the playfield.

During the third sub-test, all targets are simultaneously reset (up), then retracted (down). This "all up, all down" sequence is repeated five times.

Note: When the coin door is opened, the game's safety interlock switch (the upper switch on item 14, page C-2 of this manual) disables the 70-volt power running to the playfield. To allow coils to function in the **Drop Bank Life Test**, you must either close the coin door or pull the safety interlock switch's actuator out (it will "click" and lock in place). When you close the coin door, the interlock switch actuator will be pushed back into its normal (unlocked) position.

To exit the **Drop Bank Life Test** at any time, press the **Back/Escape** button.

DROP BANK
LIFE TEST

DROP BANK
LIFE TEST

Switch	Up Requests	Up Failures	Down Requests	Down Failures	Last Up Seen
(E)LF Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
E(L)F Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
EL(F) Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
(D)WARF Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
D(W)ARF Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
DW(A)RF Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
DWA(R)F Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
DWAR(F) Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
(M)AN Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
M(A)N Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
MA(N) Drop Target	0	0	0	0	Wed Dec 31 18:00:00 1969
Cycles	0				
Runtime	0d 00:00:00				
Individual all up / Individual all down					
Individual up / down					
All up / all down (5x)					
Status (hit enter) Paused					

Press ENTER to start lifetest

Feb 22, 2016 - 04:29:09 PM

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Figure B19. Drop Bank Life Test screen.



Smaug Head Test

When you enter the **Smaug Head Test**, the LCD monitor will display the screen shown in figure B20. The upper squares on the screen represent the states of the two U-shaped opto switches on the Smaug assembly, in the upper left corner of the playfield. One opto switch indicates that Smaug is fully rotated to the player's left; the other indicates he is fully rotated to the player's right. The lower two squares represent the states of the **Up/+** and **Down/-** buttons. A green square indicates an activated opto switch (or a button being pressed); a transparent square indicates an inactive opto switch (or no button being pressed).

There are two different modes for testing the Smaug assembly: **MANUAL** and **AUTO**. The current mode is highlighted in green text at the top of the screen; you change the current mode by pressing the **Enter** button. In **AUTO** mode, the game repeatedly rotates the Smaug assembly, left and right. When Smaug reaches a rotational limit (left or right), one of the optos should activate (Limit-left or Limit-right) as Smaug reverses direction. In **MANUAL** mode, you control the movement of Smaug with the **Up/+** and **Down/-** buttons. **Up/+** rotates Smaug to the right; **Down/-** rotates Smaug to the left. When he reaches a rotational limit (left or right), one of the opto switches should activate (Limit-left or Limit-right) as Smaug stops moving. Note: You cannot rotate the Smaug assembly beyond the point where its limit switch activates (its square will be green on the LCD screen).

To exit the **Smaug Head Test** at any time, press the **Back/Escape** button.

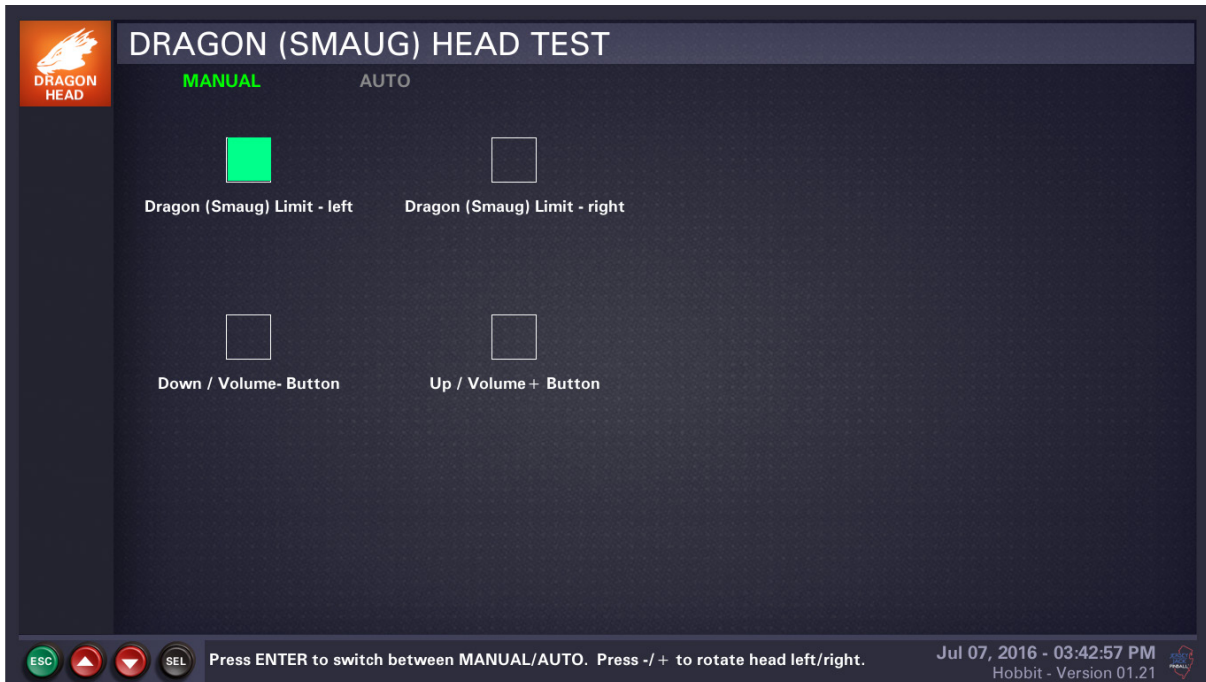


Figure B20. Smaug Head Test screen.



Smaug Mouth Test

When you enter the **Smaug Mouth Test**, the LCD monitor will display the screen shown in figure B21.

You select a mouth position to calibrate (min or max) with the **Up/+** and **Down/-** buttons. The currently selected position will be highlighted in white text. To make a change, press the **Enter** button, then use the **Up/+** and **Down/-** buttons to specify a new numeric value. You are providing rotational limits to Smaug's lower jaw servo control. The game software will use these limits to open and close Smaug's mouth during the game, as he speaks. Once you're finished adjusting a numerical value, press the **Enter** button once again to accept the change. To cancel the change, press the **Back/Escape** button.

To test the adjustments you just made to Smaug's lower jaw limits, press the **Start** button on the front of the cabinet. Smaug will recite a familiar game phrase, using the new limits for jaw movement.

To exit the **Smaug Mouth Test** at any time, press the **Back/Escape** button.

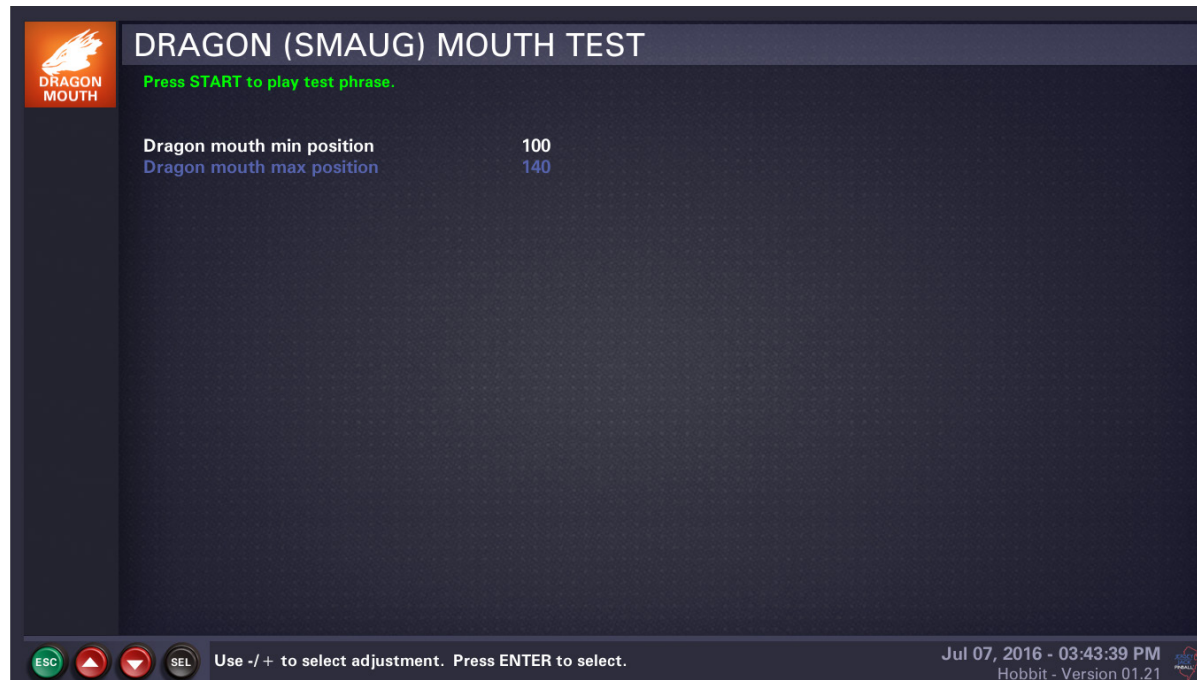


Figure B21. Smaug Mouth Test screen.

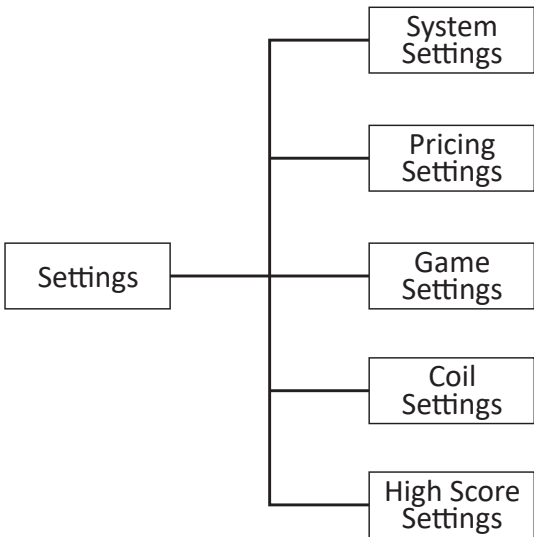
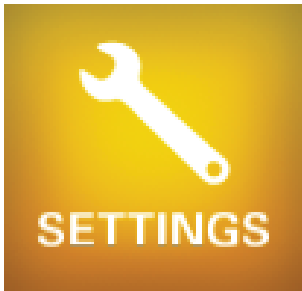


Figure B22. Settings menu tree.

B.3 Settings

The **Settings** menu (see figure B22 for an outline) allows the user to adjust system, pricing, game, coil and high score settings, to personalize the game (home use) or optimally configure it for a location or route (commercial use).

System Settings - adjust settings for high-level game controls such as balls per game, ball save time, tilt warnings, audio levels, match percentage and replay/scoring awards.

Pricing Settings - adjust settings for pricing controls such as free play, accepted currency, coin door specifics and pricing tiers/levels.

Game Settings - adjust game-specific settings such as LOCK difficulty, Kickback & Ring Button relight frequency, and Map & Book Mode difficulties.

Coil Settings - adjust kicking strength for virtually every coil in the game.

High Score Settings - adjust settings related to high scores such as whether the game will record them, what the award for high score will be, multiple player initials and default high scores.

System Settings



When you enter the **System Settings** menu, the LCD monitor will display the screen shown in figure B23. Settings that have been changed from factory defaults are displayed in red. Default settings are displayed in green, but only when a menu item is highlighted. Menu items that cannot be altered are displayed in gray. You can scroll through menu items with the **Up/+** and **Down/-** buttons; press **Enter** to select an item you would like to change. Use the **Up/+** and **Down/-** buttons to alter the highlighted data value, then press **Enter** to accept the new value. Press **Back/Escape** to escape from a selected menu item without saving changes. NOTE: Pindemption® settings are only available in a Hobbit game with a Pindemption®-enabled security dongle.

To exit the **System Settings** menu at any time, press the **Back/Escape** button.

GENERAL

Game Play Type: specify how the game will end: after a designated number of balls played or a designated amount of time. **<Pindemption® setting>**

BALLS: traditional style of pinball play Default: BALLS
TIME: timed pinball play

Ball Play Type: specify how extra balls will be played during a game. With the BALLS IN PLAY option, extra balls will be played immediately after the ball on which they are earned. With the BALLS IN RESERVE option, earned extra balls will be held until the end of the game, with players continuing to take turns playing one ball at a time until all balls in reserve have been played.

BALLS IN PLAY: extra ball played immediately Default: BALLS IN PLAY
BALLS IN RESERVE: extra ball held in reserve, to play later

Balls Per Game: specify the number of balls each player gets to play within a single game.
1-5: 1-5 balls Default: 3 balls

Time Per Game: specify how long a game will last. **<Pindemption® setting>**
30-300: 30-300 seconds Default: 45 seconds

Timed Game Over Type: specify how a timed game will end. **<Pindemption® setting>**
INSTANT DEATH: game ends when timer reaches zero. Default: INSTANT DEATH

SUDDEN DEATH: game ends when timer reaches zero and the ball in play drains.
SUDDEN TIMER: game ends when timer reaches zero and the Sudden Death Timer reaches zero.

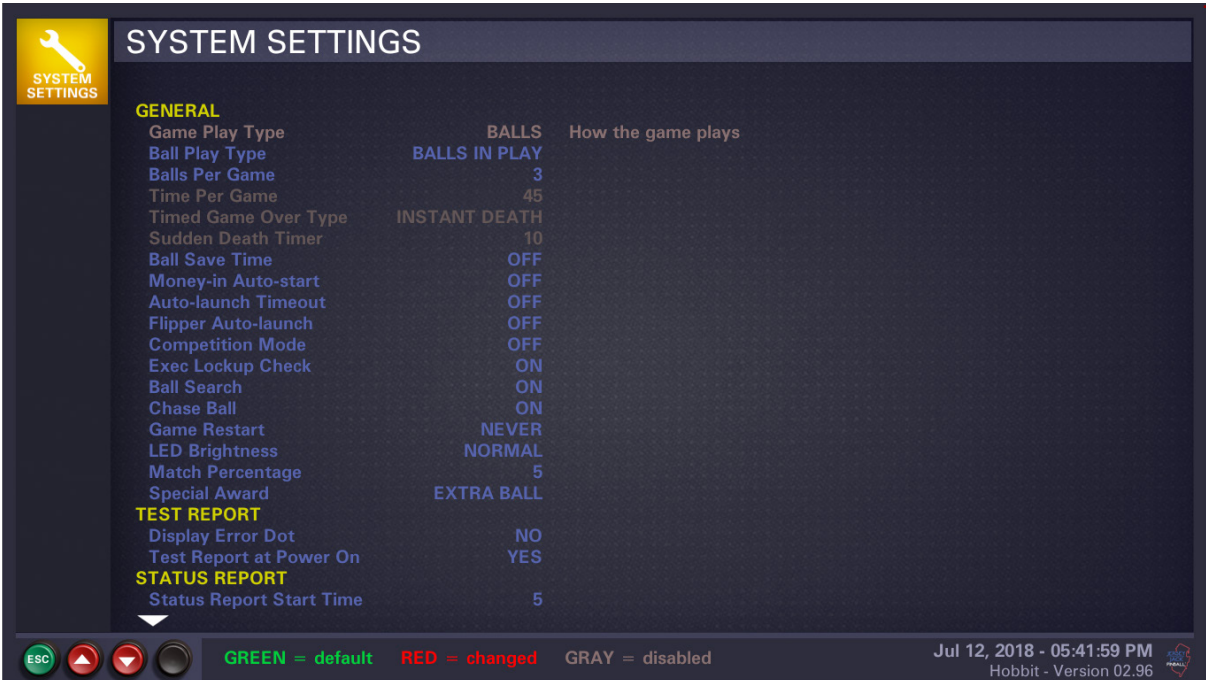


Figure B23. System Settings screen.

Sudden Death Timer: specify the amount of sudden death time. <Pindemption® setting>

2-15: 2-15 seconds

Default: 10 seconds

Ball Save Time: specify the time, from ball launch, up to which the game will Auto-Launch a replacement ball into play, if a player's ball drains for any reason (except a tilt).

OFF: ball save feature disabled

Default: OFF

1-20: 1-20 seconds

Money-In Auto-Start: specify whether the game will begin immediately when a credit equivalent, in money, has been inserted or not.

ON: begin game immediately

Default: OFF

OFF: do not begin immediately

Auto-Launch Timeout: specify whether the game will auto-launch a served ball from the shooter lane, after a designated period of time or not.

30, 60, 90: 30, 60 & 90 second auto-launch

Default: OFF

OFF: never auto-launch a served ball

Flipper Auto-Launch: specify whether the flipper buttons can be used to launch a served ball into play or not.

LEFT FLIPPER: left button launches ball

Default: OFF

RIGHT FLIPPER: right button launches ball

EITHER FLIPPER: either button launches ball

BOTH FLIPPERS: both buttons, simultaneously pressed, launch ball

OFF: flipper buttons don't launch ball

Competition Mode: specify whether the game will give random awards and allow carry-over features during gameplay or not.

ON: no random awards or carry-over features

Default: OFF

OFF: allow random awards and carry-over features

Chase Ball: specify whether a chase ball will be auto-launched into play when ball search cannot locate the ball in play.

ON: use a chase ball

Default: ON

OFF: do not use a chase ball

Game Restart: specify how the game responds to the start button being pressed in the middle of a game already in progress.

NEVER: never restart the game

Default: NEVER

SLOW: restart the game only if the start button is held in for 1/2 second or more

LED Brightness: specify the intensity level of LEDs under the playfield inserts.

LOW: lowest intensity

Default: NORMAL

LOWER: low-medium intensity

NORMAL: medium intensity

HIGH: highest intensity

Match Percentage: specify the desired percentage of games, on average, that will be awarded a match at the end.

OFF: no match feature

Default: 5%

1-20: 1-20%

Special Award: specify the award for scoring a Special during a game.

FREE GAME: a free game

Default: EXTRA BALL

EXTRA BALL: an extra ball

POINTS: a predefined number of points

TEST REPORT

Display Error Dot: specify whether to display an error dot on the LCD screen when the game detects a potential problem or not.

YES: display an error dot

Default: NO

NO: do not display an error dot

Test Report at Power On: specify whether or not to display a Test Report Message on the LCD screen, at power on, when the game detects a potential problem.

YES: display a Test Report Message

Default: YES

NO: do not display a Test Report Message

STATUS REPORT

Status Report Start Time: specify how long the player has to hold a flipper down before a game Status Report is displayed.

6-10: 6-10 seconds

Default: 6 seconds

Replay Levels: specify the number of scoring levels for replay awards (Replay: AUTO only). These Replay Scores will be set by the game. If configured, Replay Scores 2, 3 & 4 will be set at 2X, 3X & 4X the first Replay Score.

1-4: 1-4 levels

Default: 1 level

Replay Award: specify the award for achieving any replay level (Replay: AUTO only).

FREE GAME: a free game

Default: FREE GAME

EXTRA BALL: an extra ball

LIGHT SPECIAL: light the Special shot on the playfield

AUDIT: no award, just record in Audits

Replay Boost: specify whether to temporarily boost replay levels (when achieved) or not (Replay: AUTO only).

ON: use replay boost

Default: ON

OFF: no replay boost

Replay Score: displays the current replay score, which is adjusted automatically by the game.

SCORE AWARDS

Score Award Levels: specify the number of score award levels. With the score award system, you can configure up to four fixed score Levels, along with specific awards for reaching each of those levels. You can also define and employ Score Award Boosts, if desired.

0-4: 0-4 levels

Default: 0 levels

Score Level 1: specify 1st score award level (Score Award Levels: 1-4 only).

50000-500000: 50,000-500,000 points

Default: 50,000 points

Score Level 2: specify 2nd score award level (Score Award Levels: 2-4 only).

100000-1000000: 100,000-1,000,000 points

Default: 100,000 points

Score Level 3: specify 3rd score award level (Score Award Levels: 3-4 only).

200000-2000000: 200,000-2,000,000 points

Default: 200,000 points

Score Level 4: specify 4th score award level (Score Award Levels: 4 only).

400000-4000000: 400,000-4,000,000 points

Default: 400,000 points

Score Award 1: specify award for achieving score level 1 (Score Award Levels: 1-4 only).

FREE GAME: a free game

Default: EXTRA BALL

EXTRA BALL: an extra ball

LIGHT SPECIAL: light the Special shot on the playfield

AUDIT: no award, just record in Audits

Score Award 2: specify award for achieving score level 2 (Score Award Levels: 2-4 only).

FREE GAME: a free game

Default: EXTRA BALL

EXTRA BALL: an extra ball

LIGHT SPECIAL: light the Special shot on the playfield

AUDIT: no award, just record in Audits

Score Award 3: specify award for achieving score level 3 (Score Award Levels: 3-4 only).

FREE GAME: a free game

Default: EXTRA BALL

EXTRA BALL: an extra ball

LIGHT SPECIAL: light the Special shot on the playfield

AUDIT: no award, just record in Audits

Score Award 4: specify award for achieving score level 4 (Score Award Levels: 4 only).

FREE GAME: a free game

Default: EXTRA BALL

EXTRA BALL: an extra ball

LIGHT SPECIAL: light the Special shot on the playfield

AUDIT: no award, just record in Audits

Score Award Boost: specify whether to temporarily boost score levels (when achieved) or not (Score Award Levels: 1-4 only).

OFF: no score level boost

Default: OFF

10000-200000: 10,000-200,000 point boost

MONITOR

Width Scale: the width extent of the game's LCD screen, in pixels (1000 is the maximum).

Height Scale: the height extent of the game's LCD screen, in pixels (1000 is the maximum).

X Offset: the left offset for the game's LCD screen, in pixels.

Y Offset: the top offset for the game's LCD screen, in pixels.



Pricing Settings

When you enter the **Pricing Settings** menu, the LCD monitor will display the screen shown in figure B24. Settings that have been changed from factory defaults are displayed in red. Default settings are displayed in green, but only when a menu item is highlighted. Menu items that cannot be altered are displayed in gray. You can scroll through menu items with the **Up/+** and **Down/-** buttons; press **Enter** to select an item you would like to change. Use the **Up/+** and **Down/-** buttons to alter the highlighted data value, then press **Enter** to accept the new value. Press **Back/Escape** to escape from a selected menu item without saving changes.

To exit the **Pricing Settings** menu at any time, press the **Back/Escape** button.

GENERAL

Free Play: specify whether the game will play for free or not.

YES: play for free

Default: YES

NO: require currency for play

Currency: specify currency for the game to accept. Default values and currency labels under COIN DOOR and PRICING SCHEME headings change with different types of currency. Values and labels shown below are for Dollars currency.

Dollars (\$): Dollars

Default: Dollars

Euros (€): Euros

Pounds (£): Pounds

Yen (¥): Yen

Krone (kr): Krone

Krona (kr): Krona

Coins: coins

Tokens: tokens

Swipes: card swipes through a reader

Bills: bills through a bill acceptor



Figure B24. Pricing Settings screen.

Money Limit: specify the maximum amount of money the game can accept at any time.

\$0.00: Unlimited dollar amount Default: \$0.00

\$0.01-\$100,000.00: \$0.01-\$100,000.00

Credit Limit: specify the maximum number of credits the game can hold at any time.

0: Unlimited credits Default: 0

1-100: 1-100 credits

COIN DOOR

Coin Switch 1 Pulse Amount: specify the amount of currency represented by one pulse from coin switch 1.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$0.25

Coin Switch 2 Pulse Amount: specify the amount of currency represented by one pulse from coin switch 2.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$0.25

Coin Switch 3 Pulse Amount: specify the amount of currency represented by one pulse from coin switch 3.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$0.25

Coin Switch 4 Pulse Amount: specify the amount of currency represented by one pulse from coin switch 4.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$0.25

Coin Switch 5 Pulse Amount: specify the amount of currency represented by one pulse from coin switch 5.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$0.25

Card Reader Installed: specify whether a card reader is installed in the game or not.

YES: card reader installed Default: NO

NO: no card reader installed

PRICING SCHEME

Pricing Levels: specify the number of desired pricing levels (or tiers).

1-10: 1-10 levels Default: 1 level

Tier 1 Cost: specify cost for pricing tier 1.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$1.00

Tier 1 Credits: specify the number of credits for pricing tier 1.

1-100: 1-100 credits Default: 1 credit

Tier 2 Cost: specify cost for pricing tier 2.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$2.00

Tier 2 Credits: specify the number of credits for pricing tier 2.

1-100: 1-100 credits Default: 2 credits

Tier 3 Cost: specify cost for pricing tier 3.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$3.00

Tier 3 Credits: specify the number of credits for pricing tier 3.

1-100: 1-100 credits Default: 3 credits

Tier 4 Cost: specify cost for pricing tier 4.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$4.00

Tier 4 Credits: specify the number of credits for pricing tier 4.

1-100: 1-100 credits Default: 4 credits

Tier 5 Cost: specify cost for pricing tier 5.

\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$5.00

Tier 5 Credits: specify the number of credits for pricing tier 5.

1-100: 1-100 credits Default: 5 credits

Tier 6 Cost: specify cost for pricing tier 6.
\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$6.00

Tier 6 Credits: specify the number of credits for pricing tier 6.
1-100: 1-100 credits Default: 6 credits

Tier 7 Cost: specify cost for pricing tier 7.
\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$7.00

Tier 7 Credits: specify the number of credits for pricing tier 7.
1-100: 1-100 credits Default: 7 credits

Tier 8 Cost: specify cost for pricing tier 8.
\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$8.00

Tier 8 Credits: specify the number of credits for pricing tier 8.
1-100: 1-100 credits Default: 8 credits

Tier 9 Cost: specify cost for pricing tier 9.
\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$9.00

Tier 9 Credits: specify the number of credits for pricing tier 9.
1-100: 1-100 credits Default: 9 credits

Tier 10 Cost: specify cost for pricing tier 10.
\$0.01-\$100,000.00: \$0.01-\$100,000.00 Default: \$10.00

Tier 10 Credits: specify the number of credits for pricing tier 10.
1-100: 1-100 credits Default: 10 credits



Figure B25. Game Settings screen.

Game Settings

When you enter the **Game Settings** menu, the LCD monitor will display the screen shown in figure B25. Settings that have been changed from factory defaults are displayed in red. Default settings are displayed in green, but only when a menu item is highlighted. Menu items that cannot be altered are displayed in gray. You can scroll through menu items with the **Up/+** and **Down/-** buttons; press **Enter** to select an item you would like to change. Use the **Up/+** and **Down/-** buttons to alter the highlighted data value, then press **Enter** to accept the new value. Press **Back/Escape** to escape from a selected menu item without saving changes.

To exit the **Game Settings** menu at any time, press the **Back/Escape** button.

GENERAL

GI Brightness: specify the brightness level for the game's general illumination (white LEDs).

1-8: 1-8 brightness level

Default: 6 level

Floating Scores: specify whether to show point values, as they're earned, floating up the display or not.

YES: show floating scores

Default: YES

NO: do not show floating scores

Game Number: shown for Limited Edition and Collector's Edition games only.

Attract Mode Flashy Lamps: specify whether or not to display flashy attract mode lamp sequences.

ON: use flashy attract mode lamp sequences

Default: ON

OFF: do not use flashy attract mode lamp sequences

EXTRA BALL

Collect Difficulty: specify the difficulty level for collecting an extra ball.

1-6: 1-6 difficulty level

Default: 3 level

Collect Difficulty Increases: specify whether the difficulty will increase with each extra ball or not.

YES: increase difficulty for each

Default: YES

extra ball collect

NO: do not increase difficulty for each ball collect

Lock Difficulty: specify the difficulty level for lighting locks.
1-6: 1-6 difficulty level Default: 3 level

Gollum Difficulty: specify the difficulty level for lighting the Gollum ball save feature.
1-6: 1-6 difficulty level Default: 3 level

Book Mode Difficulty: specify the difficulty level for book modes.
1-7: 1-7 difficulty level Default: 4 level

Book Mode Timer Difficulty: specify the difficulty level for book mode timers.
1-5: 1-5 difficulty level Default: 4 level

Book Mode Max Timer Add: specify the maximum number of seconds that can be added to the timer per book mode.

20-90: 20-90 seconds Default: 30 seconds

Flippers Change Selected Mode: specify whether or not the flippers can be used to change the selected mode after a MODE ramp shot.

ON: allow flippers to change mode Default: ON

OFF: do not allow flippers to change mode

Spot Jewel w/Qualifier Exhausted: specify whether or not to spot an Arkenstone jewel when the book mode qualifier is exhausted.

<i>ON</i> : spot an Arkenstone jewel	Default: OFF
<i>OFF</i> : do not spot an Arkenstone jewel	

Maximum Easy Mode Locks: specify the number of mode ball locks allowed before they are qualified separately from Smaug.
0-10: 0-10 locks Default: 2 locks

Treasure Hunt Shots For Jackpot: specify the starting number of shots to recollect mode points.
1-7: 1-7 shots Default: 4 shots

Treasure Hunt Extra Ball Difficulty: specify the difficulty level for a Treasure Hunt Extra Ball.
1-3: 1-3 difficulty level Default: 2 level

Treasure Hunt Extra Ball Memory: specify whether the Treasure Hunt Extra Ball light (if unearned) should be “remembered” from ball to ball or not.

ON: remember Treasure Hunt Extra Ball Default: ON

OFF: reset Treasure Hunt Extra Ball

Beast Hurry-Up Difficulty: specify the difficulty level for collecting beast hurry-ups.
1-7: 1-7 difficulty level Default: 3 level

Prevent Overlap w/Multiball: specify whether or not Beast Hurry-Up/Frenzy and Smaug Multiball can occur simultaneously.

<i>ON:</i> Beast Hurry-Up/Frenzy and Smaug multiball cannot overlap	Default: OFF
<i>OFF:</i> Beast Hurry-Up/Frenzy and Smaug multiball can overlap	

Prevent Overlap w/Book Modes: specify whether or not Beast Hurry-Up/Frenzy and Book Modes can occur simultaneously.

ON: Beast Hurry-Up/Frenzy cannot occur during a Book Mode Default: OFF

OFF: Beast Hurry-Up/Frenzy can occur during a Book Mode

Map Difficulty: specify the map difficulty level (how quickly the spinners advance the map).
1-8: 1-8 difficulty level Default: 4 level

RING BUTTON

Starting Button Relight Difficulty: specify the initial number of switch closures required, during game play, to relight the Ring Button.

5-25: 5-25 switch closures Default: 10 switch closures

Button Relight Difficulty Increases: specify how many additional switch closures will be required to relight the Ring Button as the difficulty level increases.

1-5: 1-5 switch closures Default: 3 switch closures

Maximum Button Relight Difficulty: specify the maximum number of switch closures that will ever be required to relight the Ring Button.

25-50: 25-50 switch closures Default: 40 switch closures

Enable Button Game Start: specify whether to allow use of the Ring Button to start a game or not.

NEVER: do not allow the Ring Button Default: NEVER
to start a game

FREE PLAY: only allow the Ring Button to start a game in Free Play mode

KICKBACK

Free Kickback Difficulty: specify the difficulty level for lighting the ball kickback feature (in the left outlane) at the beginning of a ball and/or game.

1-4: 1-4 level Default: 1 level

Kickback Stack Limit: specify how many stacked kickbacks the game will hold at any time.

1-10: 1-10 kickbacks Default: 3 kickbacks

Kickback Relight Time: specify the amount of time (in seconds) to keep the kickback relight shot lit during game play.

3-30: 3-30 seconds Default: 7 seconds

Kickback Relight Difficulty: specify how often the kickback relight difficulty will increase.

PER BALL: difficulty increases every ball Default: PER GAME

PER GAME: difficulty increases every game

Kickback Ball Saver: specify whether to use Ball Save to correct for a failed kickback attempt or not.

AGGRESSIVE: cancel Ball Save if a second Default: AGGRESSIVE
outlane switch is activated after a kickback attempt

ALWAYS: if ball drains 5 seconds after a kickback attempt, activate Ball Save

NEVER: do not use Ball Save at all in conjunction with the kickback feature

BARREL BUMPERS

Barrel Bumpers Max: specify the difficulty level for the barrel bumpers feature.

1-5: 1-5 level Default: 3 level

Extra Ball Memory: specify whether the barrel bumpers Extra Ball lights (if unearned) should be “remembered” from ball to ball or not.

ON: remember barrel bumpers Extra Ball Default: ON

OFF: reset barrel bumpers Extra Ball

Of Successful Kicks For 1st Extra Ball: specify the number of barrel kicks required to light Extra Ball the first time.

5-25: 5-25 barrel kicks Default: 10 barrel kicks

Of Successful Kicks For 2nd Extra Ball: specify the number of barrel kicks required to light Extra Ball the next time.

5-75: 5-75 barrel kicks Default: 50 barrel kicks

Max Number of EBs Earned From Barrel Kicks: specify the maximum number of extra balls that can be earned via the barrel kick feature.

0-5: 0-5 extra balls Default: 3 extra balls

QUALIFIER RULE

Qualifier Extra Ball Lit: specify the difficulty setting for the qualifier extra ball shot.

Easy: speed up with every completion Default: Easy

Hard: speed up with every attempt

Extra Ball Memory: specify whether the qualifier Extra Ball light (if unearned) should be “remembered” from ball to ball or not.

ON: remember qualifier Extra Ball Default: ON

OFF: reset qualifier Extra Ball

CAPTIVE BALL

Captive Ball Award Interval: specify the hit interval (frequency) for captive ball awards.
2-10: hits Default: 5 hits

Extra Ball Memory: specify whether the captive ball Extra Ball light (if unearned) should be “remembered” from ball to ball or not.
ON: remember captive ball Extra Ball Default: ON
OFF: reset captive ball Extra Ball

Award Interval # For 1st Extra Ball: specify the captive ball interval number that will light the first Extra Ball.
1-5: interval 1-5 Default: interval 5

Award Interval # For Subsequent Extra Balls: specify the captive ball interval number that will light each subsequent Extra Ball.
6-25: interval 6-25 Default: interval 10

Max Number of EB Earned From Captive Ball: specify the maximum number of extra balls that can be earned via the captive ball feature.
0-5: 0-5 extra balls Default: 2 extra balls

BEORN MB ADD-A-BALL

Beorn Add-A-Ball: specify whether to allow Beorn target hits during multiball to add a ball or not.
ON: allow Beorn target hits to add a ball Default: ON
OFF: do not allow Beorn target hits to add a ball

MYSTERY AWARD

Extra Ball Memory: specify whether the Mystery Award Extra Ball light (if unearned) should be “remembered” from ball to ball or not.
ON: remember Mystery Award Extra Ball Default: ON
OFF: reset Mystery Award Extra Ball

Allow Tilt Warning Award: specify whether the game can grant an additional tilt warning as a Mystery Award or not.
ON: allow tilt warning Mystery Award Default: ON
OFF: do not allow tilt warning Mystery Award

WINDLANCE

Windlance Shot Difficulty: specify the difficulty level for the Windlance shot.
1-4: 1-4 difficulty level Default: 2 level

Extra Ball Memory: specify whether the Windlance Extra Ball light (if unearned) should be “remembered” from ball to ball or not.
ON: remember Windlance Extra Ball Default: ON
OFF: reset Windlance Extra Ball

POP-UP MECHS

This Game Settings section allows you to disable any broken or otherwise non-functional pop-up mechanisms. Below are the possible options & default for each setting:
YES: pop-up mechanism disabled Default: NO
NO: pop-up mechanism enabled

Spider Pop-Up Disabled: specify whether to disable the Spider Pop-Up mechanism or not.

Goblin Pop-Up Disabled: specify whether to disable the Goblin Pop-Up mechanism or not.

Orc Pop-Up Disabled: specify whether to disable the Orc Pop-Up mechanism or not.

Warg Pop-Up Disabled: specify whether to disable the Warg Pop-Up mechanism or not.

DROP TARGETS

This Game Settings section allows you to disable any broken or otherwise non-functional drop targets. Below are the possible options & default for each setting:

YES: drop target disabled

Default: NO

NO: drop target enabled

Disable MAN Drop Target: specify whether to disable the N drop target or not.

Disable MAN Drop Target: specify whether to disable the A drop target or not.

Disable MAN Drop Target: specify whether to disable the M drop target or not.

Disable DWARF Drop Target: specify whether to disable the F drop target or not.

Disable DWARF Drop Target: specify whether to disable the R drop target or not.

Disable DWARF Drop Target: specify whether to disable the A drop target or not.

Disable DWARF Drop Target: specify whether to disable the W drop target or not.

Disable DWARF Drop Target: specify whether to disable the D drop target or not.

Disable ELF Drop Target: specify whether to disable the F drop target or not.

Disable ELF Drop Target: specify whether to disable the L drop target or not.

Disable ELF Drop Target: specify whether to disable the E drop target or not.

GENERAL

Kickouts: Restrict Kickout on Error: specify whether or not to restrict ball kickouts on other devices when an opto switch failure is encountered.

YES: restrict ball kickouts Default: YES
NO: do not restrict ball kickouts

Maximum Shaker Strength: specify the strength for the shaker motor.

OFF: disable the shaker motor Default: MEDIUM
LOW: low strength
MEDIUM: medium strength
HIGH: high strength
EXTREME: extreme strength (adjust to EXTREME at your own risk!)

FLIPPERS

Left Flipper Strength: specify the firing strength for the left flipper power coil.

1-32: 1-32 firing strength Default: 22

Right Flipper Strength: specify the firing strength for the right flipper power coil.

1-32: 1-32 firing strength Default: 22

Upper Right Flipper Strength: specify the firing strength for the upper right flipper power coil.

1-32: 1-32 firing strength Default: 18

BUMPERS

Left Bumper Strength: specify the firing time for the left pop bumper coil.

20-40: 20-40 milliseconds Default: 30 milliseconds

Right Bumper Strength: specify the firing time for the right pop bumper coil.

20-40: 20-40 milliseconds Default: 30 milliseconds

Center Bumper Strength: specify the firing time for the center pop bumper coil.

20-40: 20-40 milliseconds Default: 30 milliseconds

SLINGSHOTS

Left Slingshot Strength: specify the firing time for the left slingshot coil.

35-64: 35-64 milliseconds Default: 52 milliseconds

Right Slingshot Strength: specify the firing time for the right slingshot coil.

35-64: 35-64 milliseconds Default: 52 milliseconds

Upper Left Slingshot Strength: specify the firing time for the upper left slingshot coil.

10-20: 10-20 milliseconds Default: 15 milliseconds

VERTICAL UP-KICKERS

Balin VUK Strength: specify the firing strength for the Balin (left) VUK coil.

1-32: 1-32 firing strength Default: 14

Radagast VUK Strength: specify the firing strength for the Radagast (right) VUK coil.

1-32: 1-32 firing strength Default: 14

KICKBACK/WINDLANCE

Kickback/Windlance Strength: specify the firing time for the kickback/Windlance coil.

6-32: 6-32 milliseconds Default: 10 milliseconds

Kickback Delay: specify the amount of time to delay kicking the kickback/Windlance coil.

0-60: 0-60 milliseconds Default: 30 milliseconds

DROP TARGETS

Drop Target Reset Time: specify the firing time for drop target resets (up).

12-36: 12-36 milliseconds Default: 22 milliseconds

Drop Target Retract Time: specify the firing time for drop target retracts (down).

16-48: 16-48 milliseconds Default: 32 milliseconds

High Score Name Length: specify the maximum number of characters a player can enter for HSTD.

3, 11: 3 or 11 characters

Default: 11

H.S.T.D. Reset Every: specify how often (in number of games) high scores will be reset.

OFF: never reset high scores

Default: OFF

200-10000: 200-10,000 games

Champion Credits: specify the number of credits awarded for the Grand Champion score.

0-10: 0-10 credits

Default: 1 credit

H.S.T.D. 1 Credits: specify the number of credits awarded for high score to date #1.

0-10: 0-10 credits

Default: 1 credit

H.S.T.D. 2 Credits: specify the number of credits awarded for high score to date #2.

0-10: 0-10 credits

Default: 1 credit

H.S.T.D. 3 Credits: specify the number of credits awarded for high score to date #3.

0-10: 0-10 credits

Default: 1 credit

H.S.T.D. 4 Credits: specify the number of credits awarded for high score to date #4.

0-10: 0-10 credits

Default: 1 credit

H.S.T.D. 5 Credits: specify the number of credits awarded for high score to date #5.

0-10: 0-10 credits

Default: 0 credits

H.S.T.D. 6 Credits: specify the number of credits awarded for high score to date #6.

0-10: 0-10 credits

Default: 0 credits

H.S.T.D. 7 Credits: specify the number of credits awarded for high score to date #7.

0-10: 0-10 credits

Default: 0 credits

H.S.T.D. 8 Credits: specify the number of credits awarded for high score to date #8.

0-10: 0-10 credits

Default: 0 credits

Default Grand Champ: specify the default Grand Champion score.

500000-1000000: 500,000-1,000,000 points

Default: 500,000 points

Default H.S.T.D. 1: specify the default high score to date #1.

400000-900000: 400,000-900,000 points

Default: 400,000 points

Default H.S.T.D. 2: specify the default high score to date #2.

300000-800000: 300,000-800,000 points

Default: 300,000 points

Default H.S.T.D. 3: specify the default high score to date #3.

250000-700000: 250,000-700,000 points

Default: 250,000 points

Default H.S.T.D. 4: specify the default high score to date #4.

200000-600000: 200,000-600,000 points

Default: 200,000 points

Default H.S.T.D. 5: specify the default high score to date #5.

150000-500000: 150,000-500,000 points

Default: 150,000 points

Default H.S.T.D. 6: specify the default high score to date #6.

125000-400000: 125,000-400,000 points

Default: 125,000 points

Default H.S.T.D. 7: specify the default high score to date #7.

100000-250000: 100,000-250,000 points

Default: 100,000 points

Default H.S.T.D. 8: specify the default high score to date #8.

75000-200000: 75,000-200,000 points

Default: 75,000 points

DAILY HIGH SCORES

Keep Daily High Scores: specify whether the game will display a table of daily high scores or not.

ON: track & display daily high scores

Default: ON

OFF: disable the daily high scores feature

Minimum Daily High Score: specify the minimum score to qualify for the daily high scores table.

10000-100000: 10,000-100,000 points

Default: 20,000 points

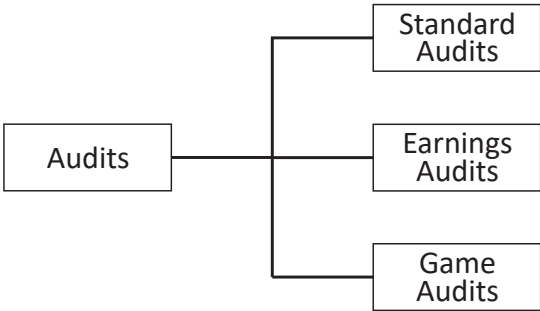


Figure B28. Audits menu tree.

B.4 Audits

The **Audits** menu (see figure B28 for an outline) allows the user to view, monitor and/or track game usage and earnings over a specific time period (since audits were last cleared and over the lifetime of the game).

Standard Audits - view game-related totals such as free plays, 1-, 2-, 3- & 4-player games started, extra balls, replays, matches, etc.

Earnings Audits - view totals for paid credits, free plays, service credits, pricing tier purchases and coins accepted in each slot.

Game Audits - view totals for various shots made (targets hit or switches closed) and modes started and/or completed in the game.

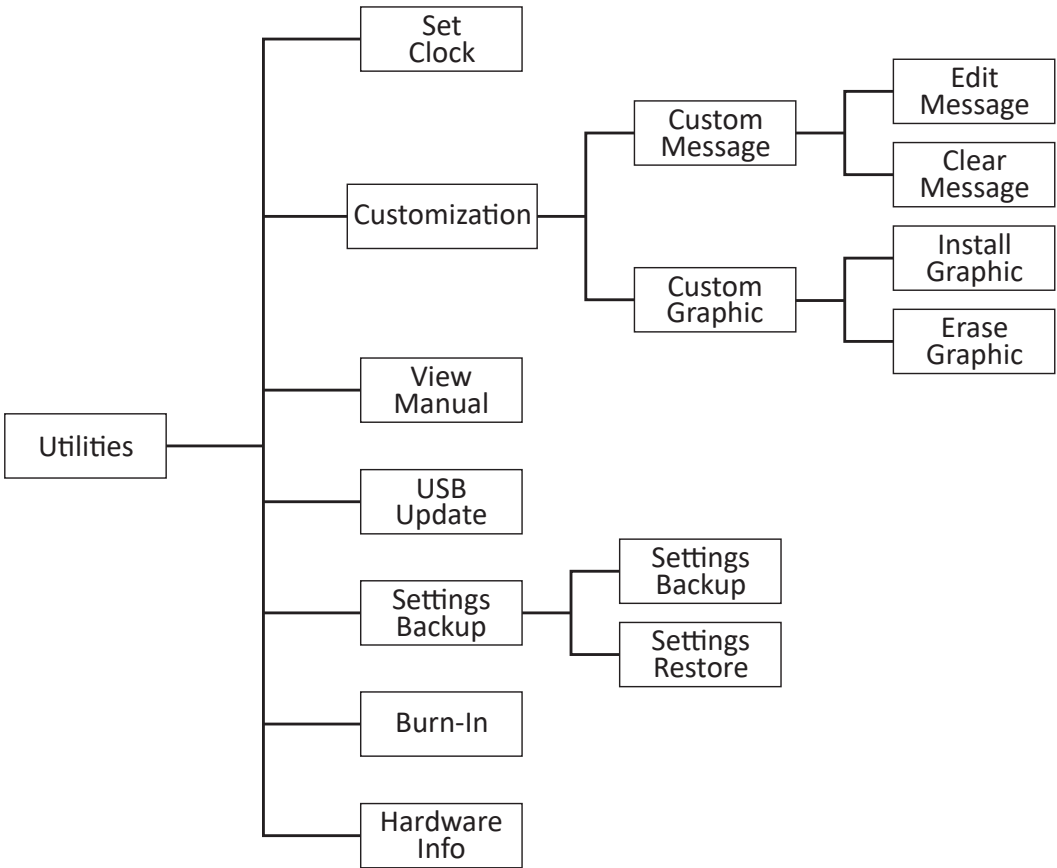


Figure B29. Utilities menu tree.

B.5 Utilities

The **Utilities** menu (see figure B29 for an outline) allows the user to manage and maintain the game by setting the internal clock, entering messages/graphics and through commonly-used routines like burn-in and software update. There are also utility screens to save/restore settings and view this manual and/or game hardware information.

- Set Clock** - adjust the system date and time.
- Customization** - customize your game: enter/modify a message for the game to display in attract mode (**Custom Message > Edit Message**), clear an existing message (**Custom Message > Clear Message**), upload/select an image (**Custom Graphic > Install Graphic**) for the game to display in attract mode or erase a previously uploaded graphic with the **Custom Graphic > Erase Graphic** utility.
- View Manual** - display/navigate the PDF version of the Hobbit manual on the game’s LCD screen.
- USB Update** - update the game’s software via a USB memory stick. Note: The update must be downloaded from the JJP® support website (<https://www.jerseyjackpinball.com/support/>), using a separate computer.
- Settings Backup** - backup (**Settings Backup**) and/or restore (**Settings Restore**) settings, audits, replay information and custom message for the game.
- Burn-In** - run a preset routine to exercise all of the critical devices in the game, repeatedly, to test for reliable, long-term system operation.
- Hardware Info** - view game hardware characteristics such as game serial number, firmware revision levels, motherboard type, display information, available RAM, processor speed & solid state disk size.



Set Clock

When you enter the **Set Clock** utility, the LCD monitor will display the screen shown in figure B30. To maneuver to the portion of the display that requires adjustment, use the **Back/Escape** (left) and **Enter** (right) buttons. Use the **Up/+** and **Down/-** buttons to alter the highlighted value, then press the **Start** button to save the time and date, as displayed on the screen.

To exit the **Set Clock** utility, move the cursor to the position shown in Figure B30 (far left), then press the **Back/Escape** button. Note: The **Start** button moves the cursor to this position after saving the time/date.

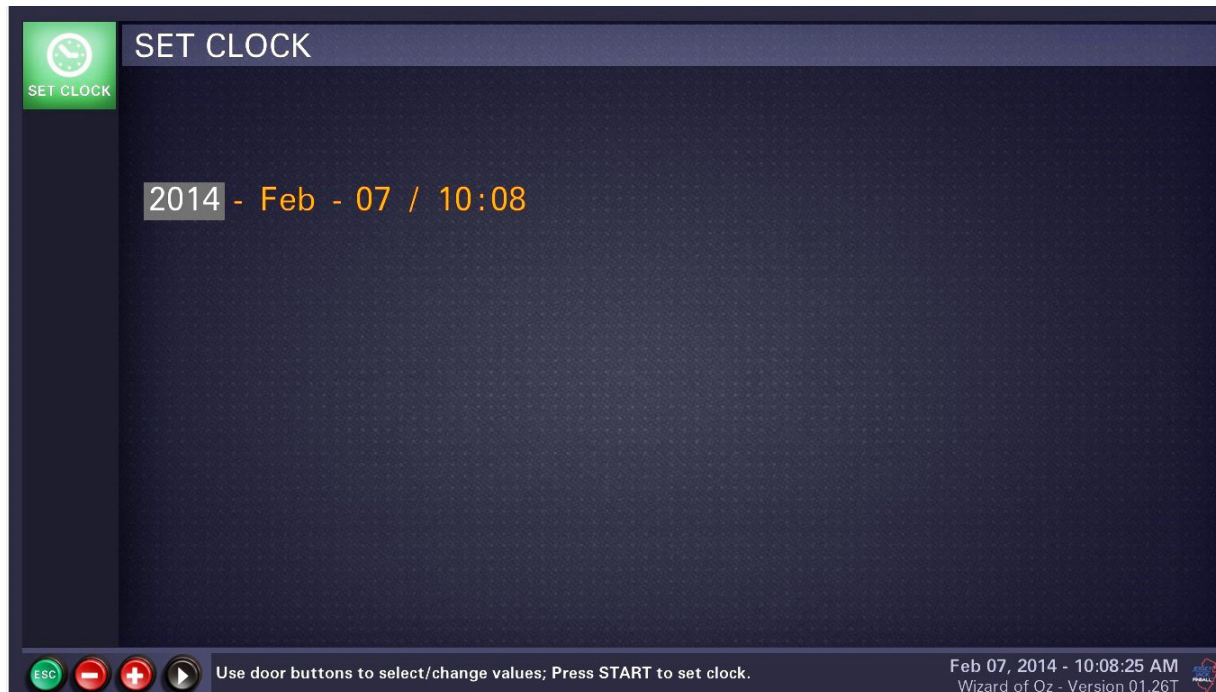


Figure B30. Set Clock utility screen.



Edit Message

Use the **Custom Message** utility to enter a message that will be displayed on the LCD monitor, periodically, during the game's attract mode. The message is entered or modified using the **Edit Message** utility.

When you enter the **Edit Message** utility, the LCD monitor will display the screen shown in figure B31. To move the cursor around in the message, use the **Back/Escape** (move left) and **Enter** (move right) buttons. Use the **Up/+** and **Down/-** buttons to change the highlighted character, then press the **Start** button to save your custom message, as displayed on the screen.

To exit the **Edit Message** utility, move the cursor to the position shown in Figure B31 (the upper left hand corner), then press the **Back/Escape** button. Note: The **Start** button moves the cursor to this position after saving the message.



Figure B31. Edit Message utility screen.



Clear Message

Use the **Clear Message** utility to delete a previously entered custom message.

When you enter the **Clear Message** utility, the LCD monitor will display the screen shown in figure B32. To clear the current custom message, press the **Enter** button. You will be prompted to hit the **Start** button to confirm and complete the operation.

To exit the **Clear Message** utility at any time, press the **Back/Escape** button.

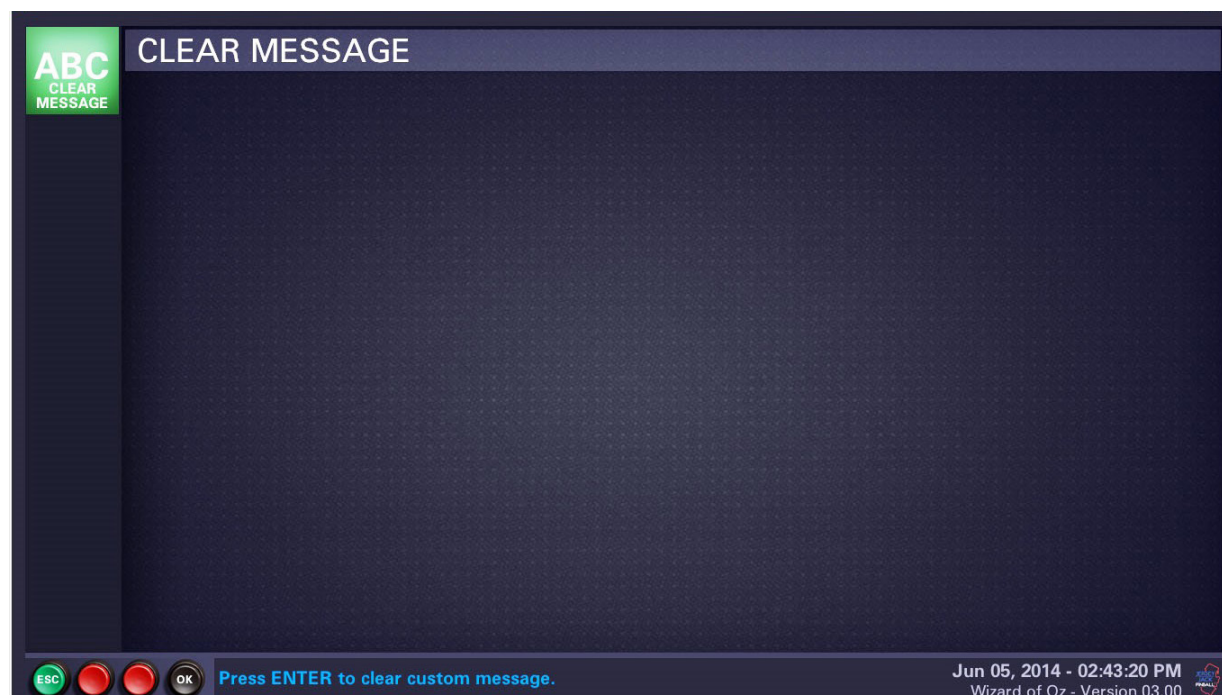


Figure B32. Clear Message utility screen.



Install Graphic

Use the **Custom Graphic** utility to install an image that will be displayed on the LCD monitor, periodically, during the game’s attract mode. The custom image is uploaded or changed using the **Install Graphic** utility.

Note: The image must be loaded onto a USB memory stick, using a separate computer. It must be in PNG or JPG format and under 2MB in size. Create a folder named “pinballimages” in the root directory of the USB stick, then copy your graphic(s) into the folder. Power up the game, open the coin door, and use the diagnostics buttons to enter the **Install Graphic** utility; the LCD monitor will display the screen shown on the left in figure B33.

Locate the end of the USB extension cable, just inside the open coin door. Fully insert the USB stick into the connector at the end of the cable (if your USB stick is equipped with an “in-use” light, it will illuminate). The screen on the right in figure B33 will come up automatically, showing a listing of the available graphics in your USB stick’s “pinballimages” folder.

Use the **Up/+** and **Down/-** buttons to select the graphic you wish to install, then press the **Enter** button to complete the operation.

To exit the **Install Graphic** utility at any time, press the **Back/Escape** button.

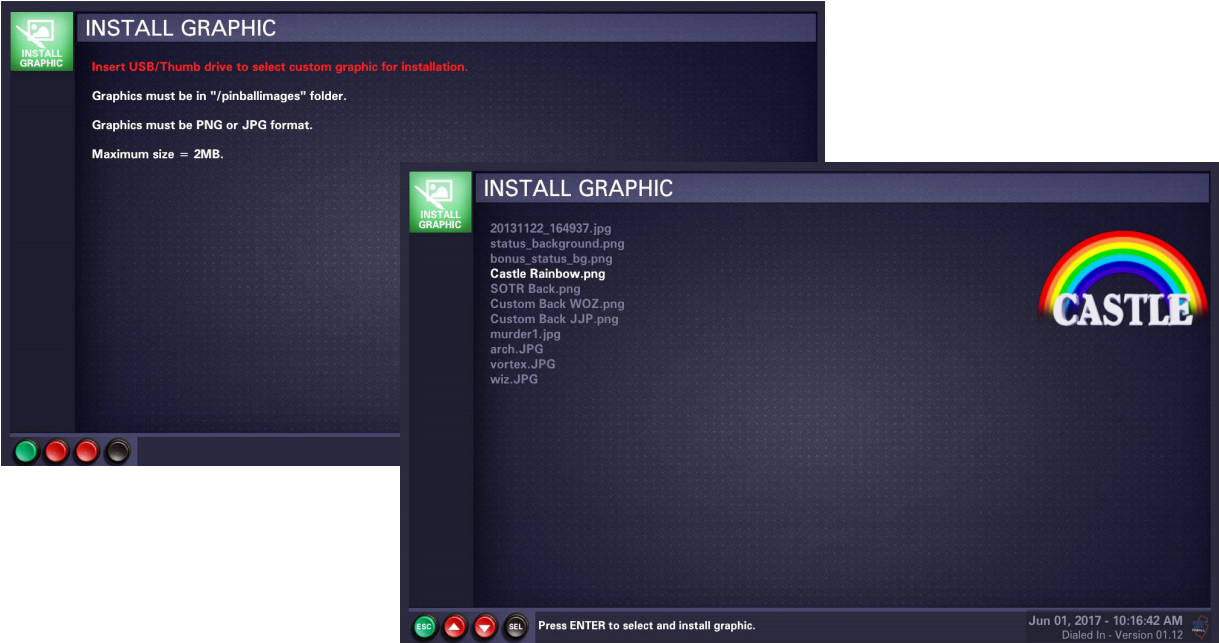


Figure B33. Install Graphic utility screens.



Erase Graphic

Use the **Erase Graphic** utility to delete a previously installed custom graphic.

When you enter the **Erase Graphic** utility, the LCD monitor will display the screen shown in figure B34. To clear the current custom graphic, press the **Enter** button. You will be prompted to hit the **Start** button to confirm and complete the operation.

To exit the **Erase Graphic** utility at any time, press the **Back/Escape** button.

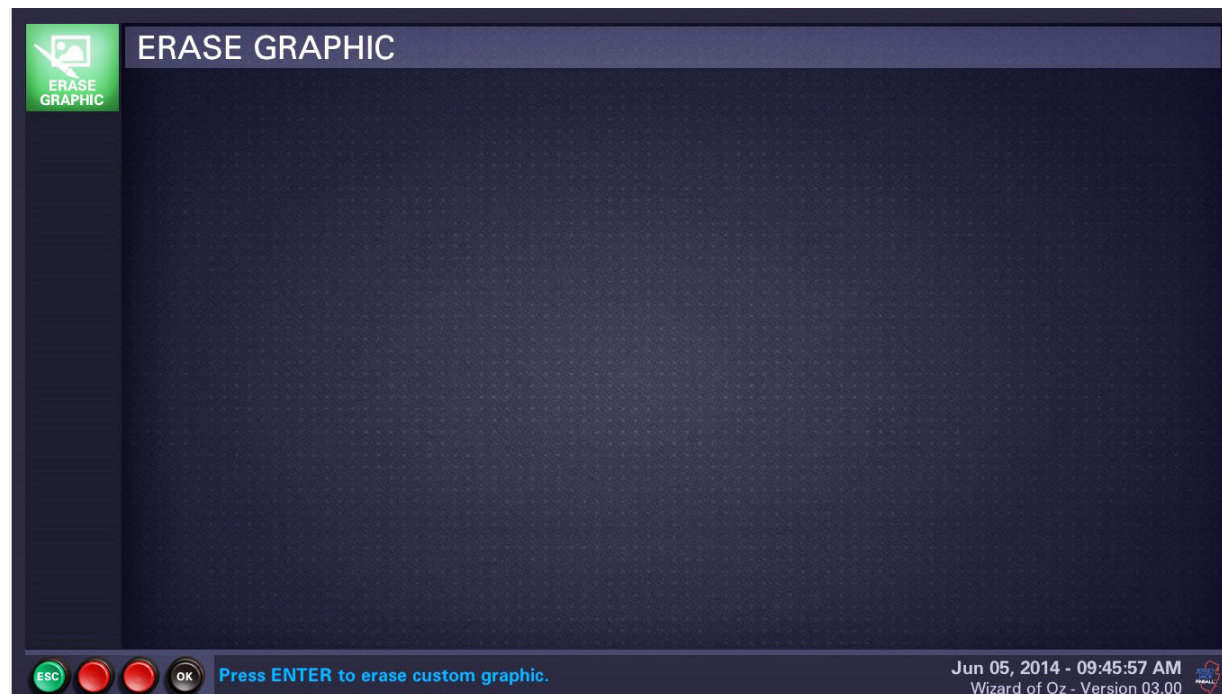
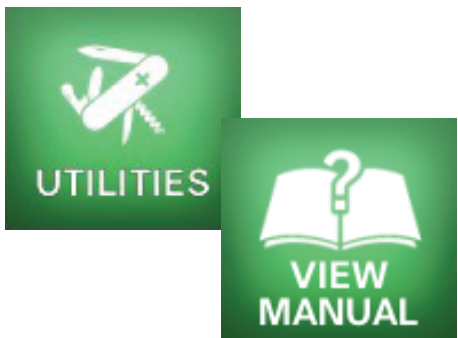


Figure B34. Erase Graphic utility screen.



View Manual

When you enter the **View Manual** utility, the LCD monitor will display the screen shown in figure B35. To view the Hobbit Operations Manual (this document), press the **Enter** button. While viewing, use the **Up/+** and **Down/-** buttons to move from page to page; use the **Enter** button to zoom in on the current page. When zoomed in, use the **Up/+** and **Down/-** buttons to move around the current page; use the **Back/Escape** button to cancel the zoom function.

To exit the **View Manual** utility, press the **Back/Escape** button while in the viewing mode.

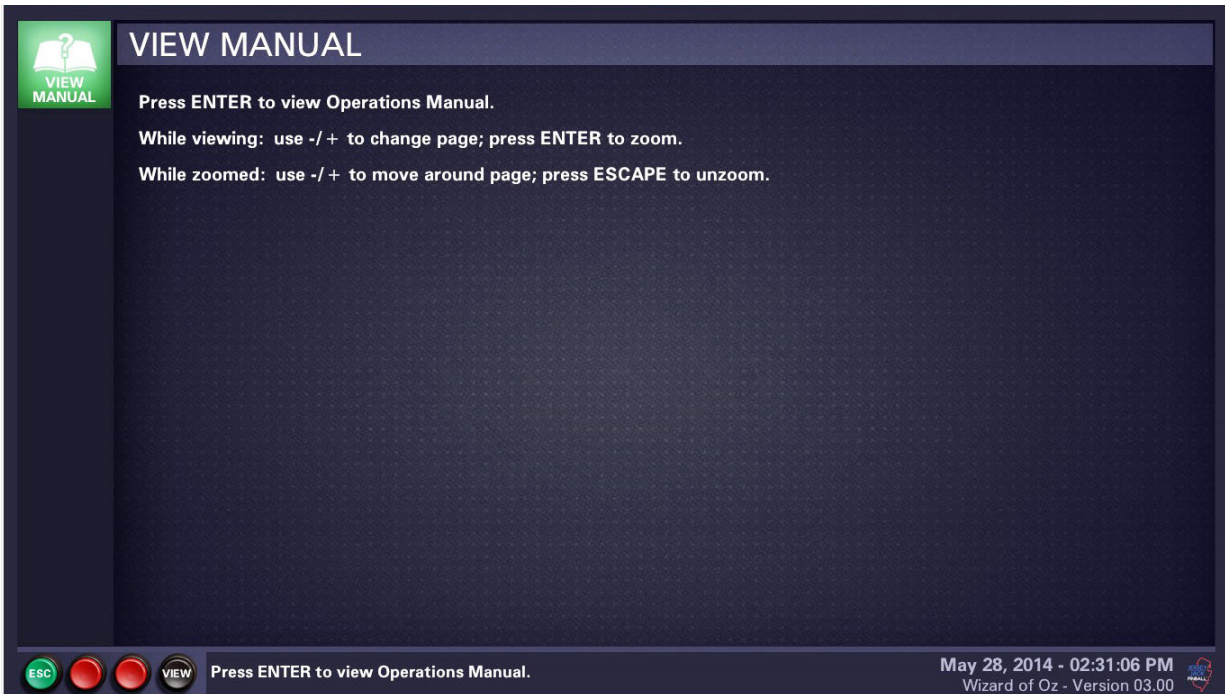


Figure B35. View Manual utility screen.



USB Update

Use the **USB Update** utility to apply a Hobbit delta software update to your game. Note: The update must be downloaded from the JJP® support website (<https://www.jerseyjackpinball.com/support/>), using a separate computer. Copy the “hobbit_update” folder from your computer onto an empty USB memory stick (i.e. it should be the only folder on the stick). Power up the game, open the coin door, and use the diagnostics buttons to enter the **USB Update** utility; the LCD monitor will display the screen shown in figure B36.

Locate the end of the USB extension cable, just inside the open coin door. Fully insert the USB stick into the connector at the end of the cable (if your USB stick is equipped with an “in-use” light, it will illuminate).

To attempt the USB delta update, press the **Enter** button. The game’s playfield and LCD monitor will go blank/dark for approximately 15-30 seconds (depending upon the size of the update). You can abort the update process by pressing the **Back/Escape** button. When the game and monitor come back to life, verify that the delta update installed successfully by re-entering the Hobbit Menu System. The installed software version is displayed in the lower, right hand corner of most menu system screens.

When you’re satisfied that the delta update was applied correctly, remove the USB stick from the end of the USB extension cable (there is no need to power down the game before performing this action). To exit the **USB Update** utility, press the **Back/Escape** button.

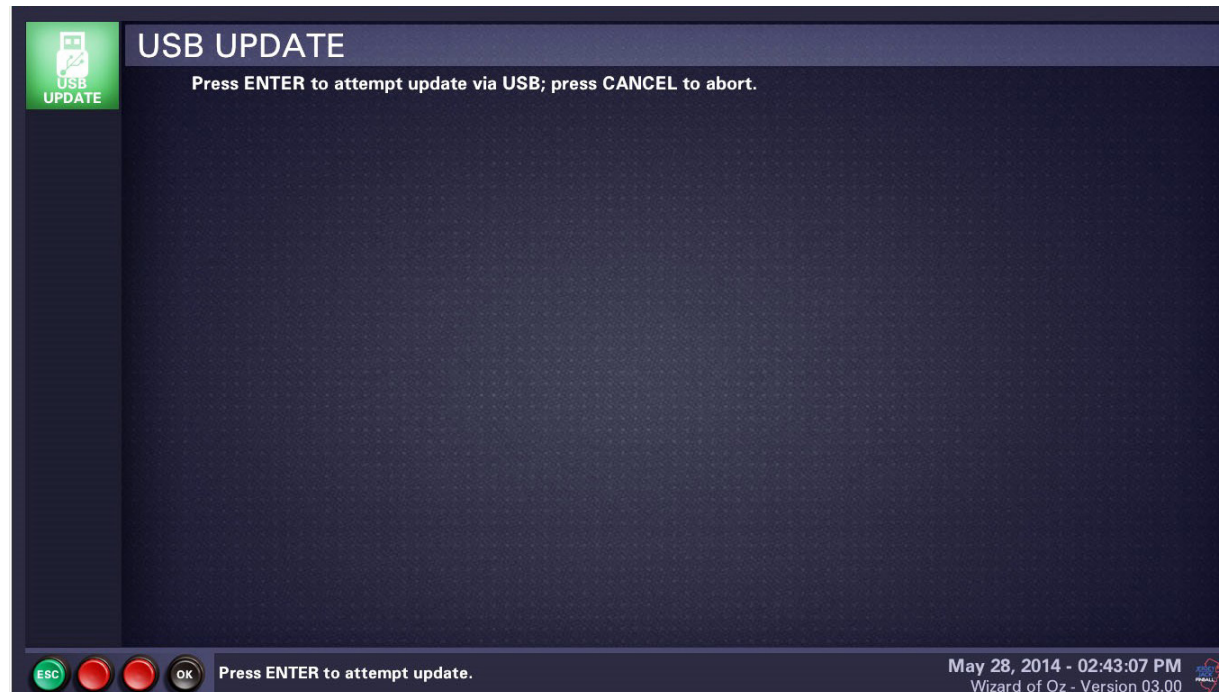


Figure B36. USB Update utility screen.



Settings Backup

The **Settings Backup** & **Settings Restore** utilities allow you to quickly and easily backup & restore your game's settings, audits, reports, replay information and custom message. Your settings will be stored on a USB memory stick.

When you enter the **Settings Backup** utility, the LCD monitor will display the screen shown in figure B37. Locate the end of the USB extension cable, just inside the open coin door. Fully insert a USB stick into the connector at the end of the cable (if your USB stick is equipped with an "in-use" light, it will illuminate).

Note: The saved settings file is unique to each game (allowing you to use the same USB stick to backup settings for several different games, without fear of overwriting anything). The file is also time- and date-stamped, using the game's internal clock.

Press the **Enter** button to perform the backup. If there is an existing settings file for the game on the USB stick, you will be prompted to hit the **Start** button to confirm and complete overwriting the backup.

To exit the **Settings Backup** utility, press the **Back/Escape** button.

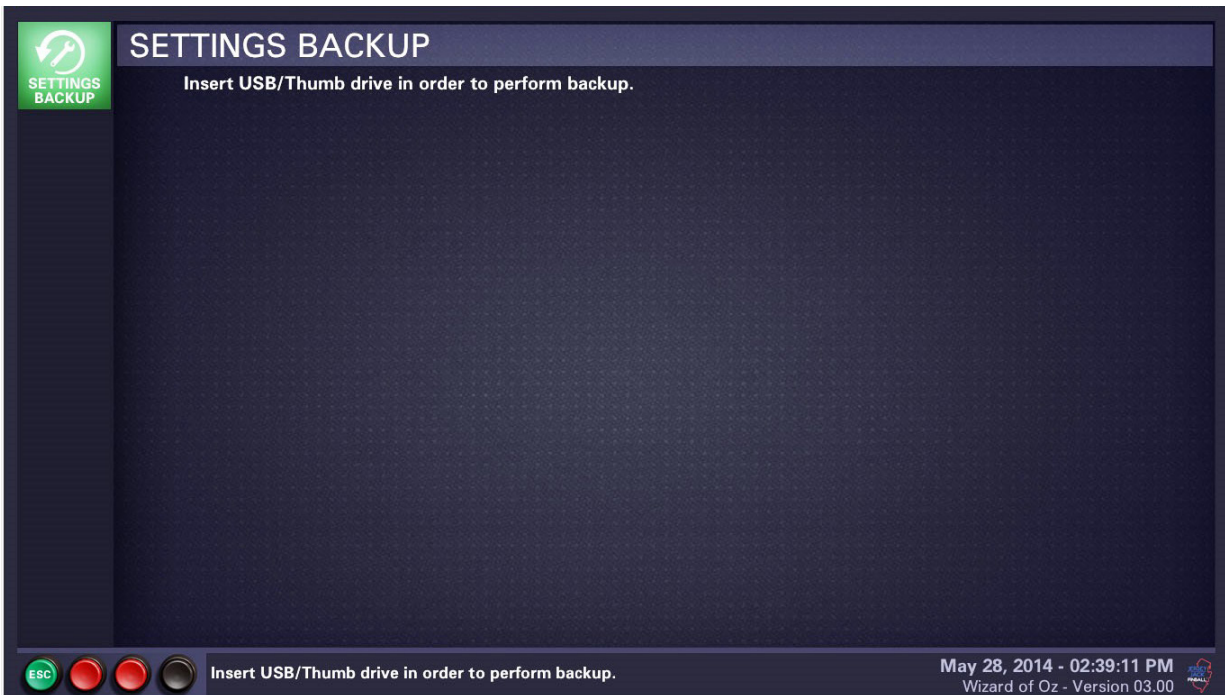


Figure B37. Settings Backup utility screen.



Settings Restore

The **Settings Backup** & **Settings Restore** utilities allow you to quickly and easily backup & restore your game's settings, audits, reports, replay information and custom message. Your settings will be restored from a USB memory stick.

When you enter the **Settings Restore** utility, the LCD monitor will display the screen shown in figure B38. Locate the end of the USB extension cable, just inside the open coin door. Fully insert the USB stick containing your settings file into the connector at the end of the cable (if your USB stick is equipped with an "in-use" light, it will illuminate).

Note: The saved settings file is unique to each game (so you can use the same USB stick to backup settings for several different games, without fear of overwriting anything). The file is also time- and date-stamped, using the game's internal clock.

If a settings file for the game is found on the USB stick, its date and time will be displayed as shown in figure B38. Press the **Enter** button to perform the settings restore operation.

To exit the **Settings Restore** utility, press the **Back/Escape** button.

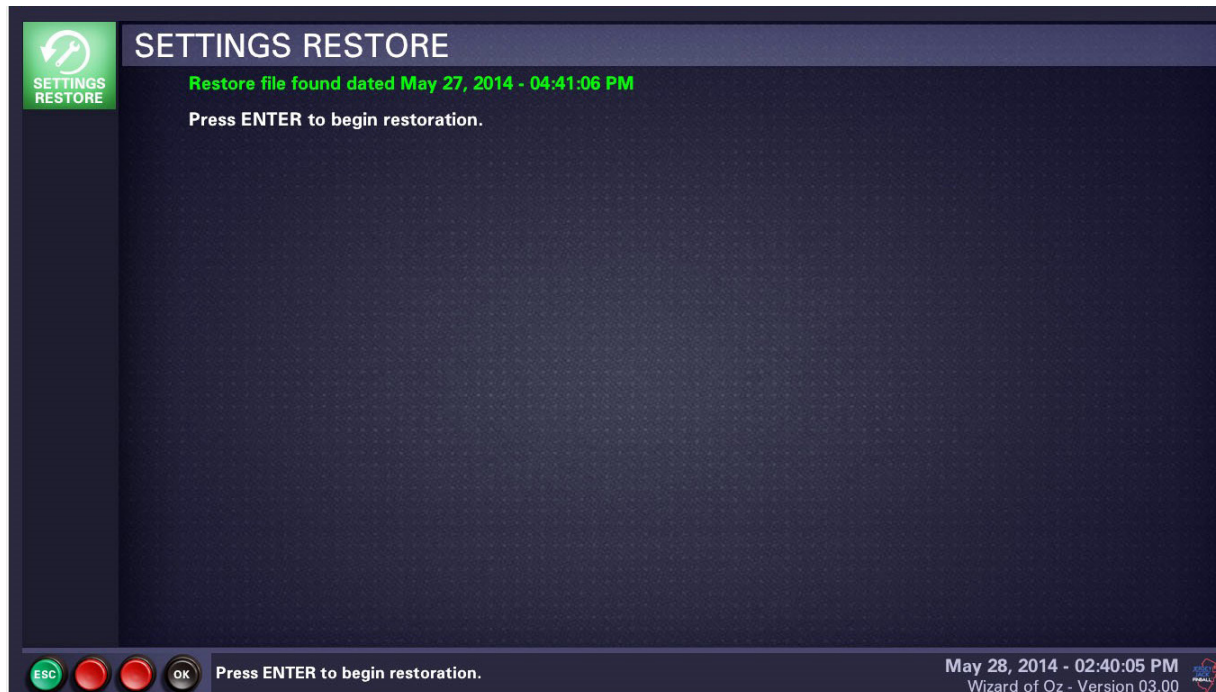


Figure B38. Settings Restore utility screen.



Burn In

The **Burn In** utility allows you to repeatedly exercise/test virtually all of the critical devices in the Hobbit game. When you enter the utility, the game will cycle through a preset routine to simultaneously fire coils, activate magnets, run motors, flash colors on the LCD screen, play sounds, etc. - indefinitely.

To exit the **Burn In** utility at any time, press the **Back/Escape** button.



Hardware Info

Use the **Hardware Info** utility to view your game's hardware characteristics such as serial number, firmware revision levels, motherboard type, available RAM, processor speed & solid state disk size. When you enter the **Hardware Info** utility, the LCD monitor will display the screen shown in figure B39.

To exit the **Hardware Info** utility at any time, press the **Back/Escape** button.

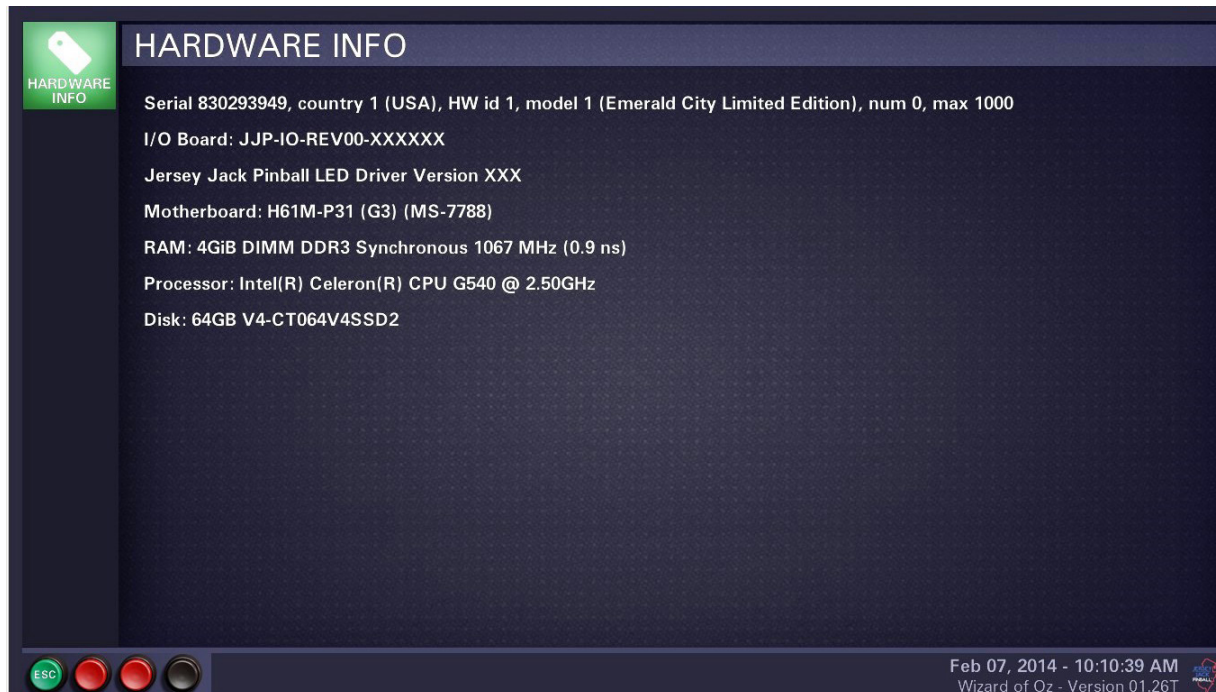


Figure B39. Hardware Info utility screen.

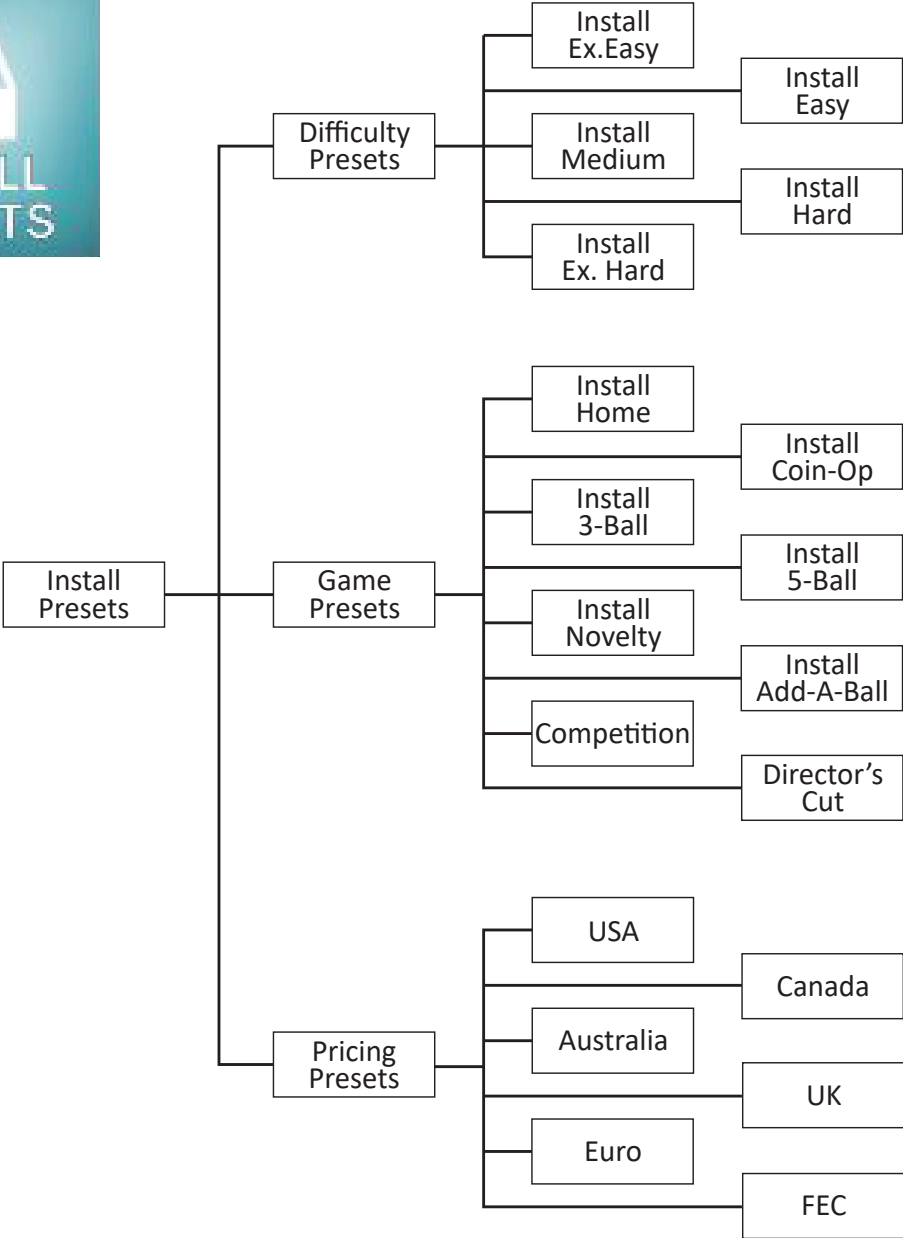


Figure B40. Install Presets menu tree.

B.6 Install Presets

The **Install Presets** menu (see figure B40 for an outline) allows the user to quickly make quantum, predefined changes to game play settings (as opposed to changing settings individually, in other sub-menus).

Difficulty Presets - change a predefined group of game/system settings to quickly make the game easier or more difficult to play. The difficulty level options are listed in figure B40.

Game Presets - change a predefined group of game/system settings to quickly configure the game to play in one of the standard modes listed in figure B40.

Pricing Presets - change a predefined group of pricing settings to quickly configure the game to accept coinage from one of the countries listed in figure B40.

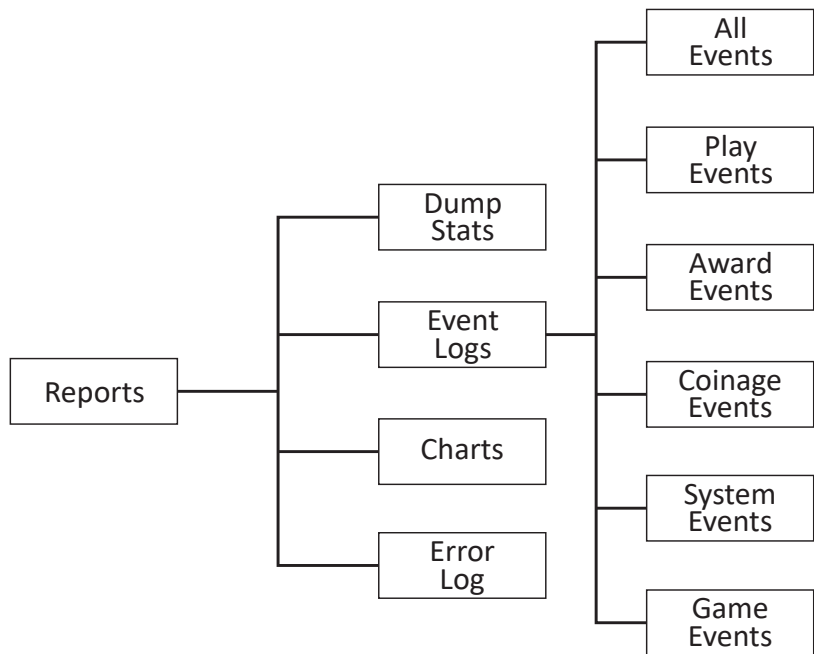


Figure B41. Reports menu tree.

B.7 Reports

The **Reports** menu (see figure B41 for an outline) allows the user to view logs and graphs of events of interest in the game including bad switch alerts, device errors, game power-ups, service credits, game statistics, awards, etc.

Dump Stats - dump game statistics to a USB drive for records or detailed, offline analysis.

Event Logs - view logs for various system events including when the power was cycled on the game, when the game was started, when the coin door was opened, when service credits were added, when game awards were earned, etc.

Charts - view charts of statistics such as games played per day, game times, game scores, etc.

Error Log - view the contents of the game’s error log.

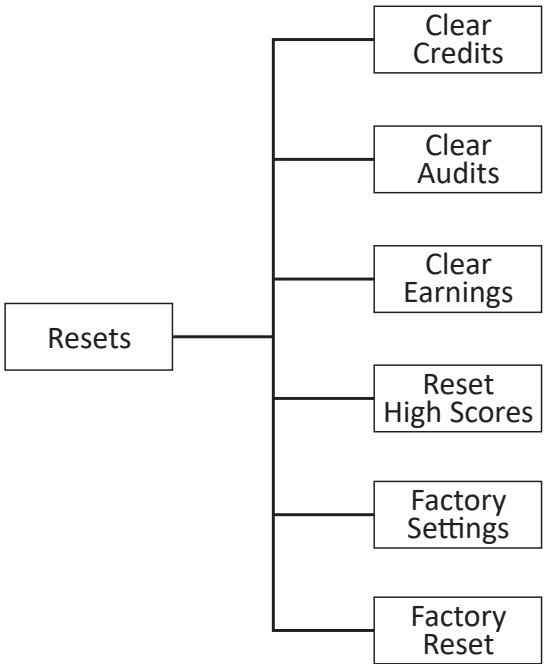
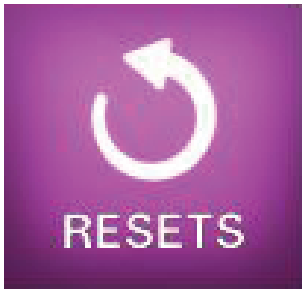


Figure B42. Resets menu tree.

B.8 Resets

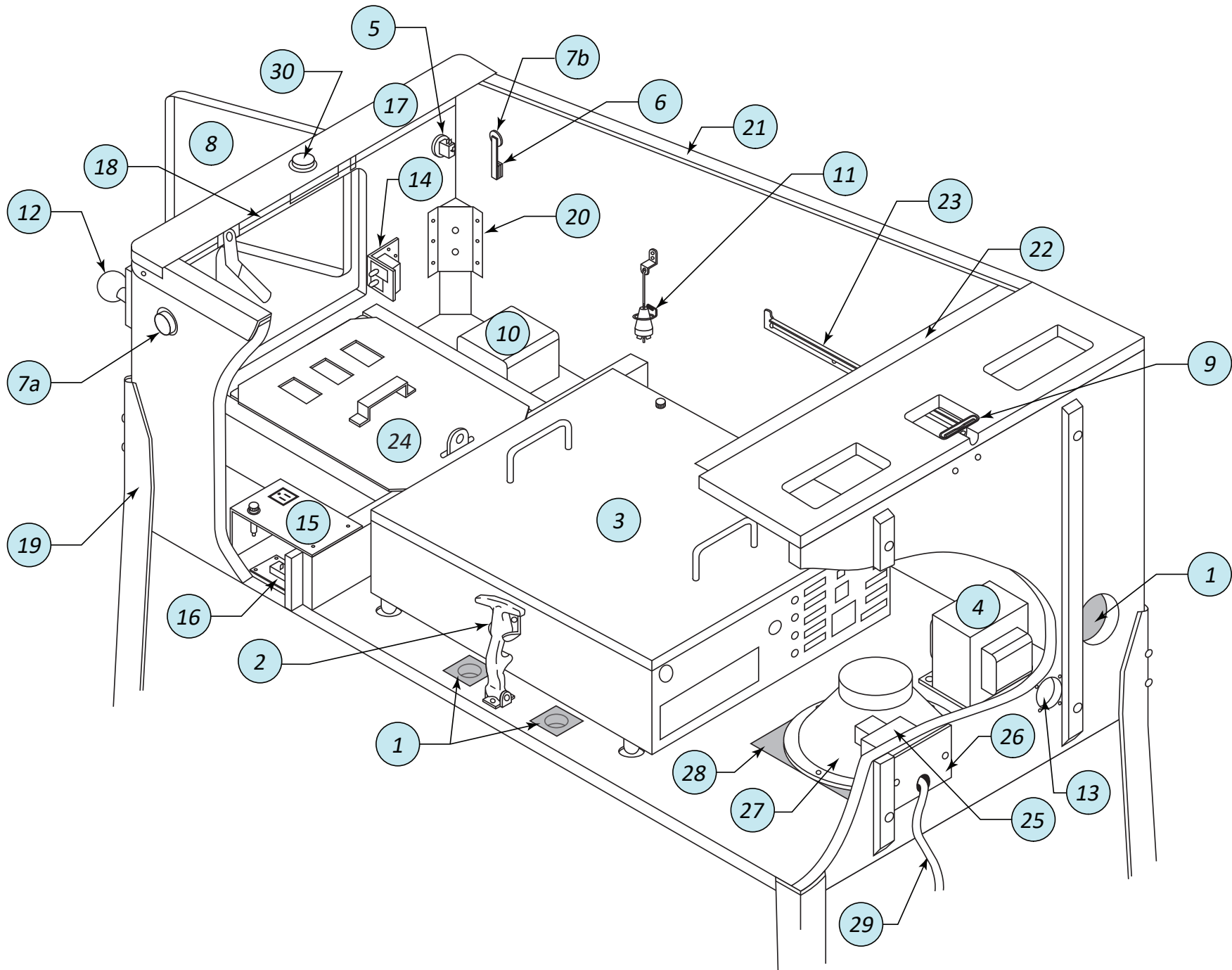
- The **Resets** menu (see figure B42 for an outline) allows the user to quickly clear game audits/earnings information and high scores from a single menu.
- Clear Credits** - clear credits from the game.
 - Clear Audits** - reset audits data.
 - Clear Earnings** - reset earnings data.
 - Reset High Scores** - reset high scores to default values (see **High Score Settings** in Section B.3).
 - Factory Settings** - reset all software-adjustable settings to the values they originally were given at the factory.
 - Factory Reset** - reset factory settings (as above) plus reset audits and alarm counters.



Section C

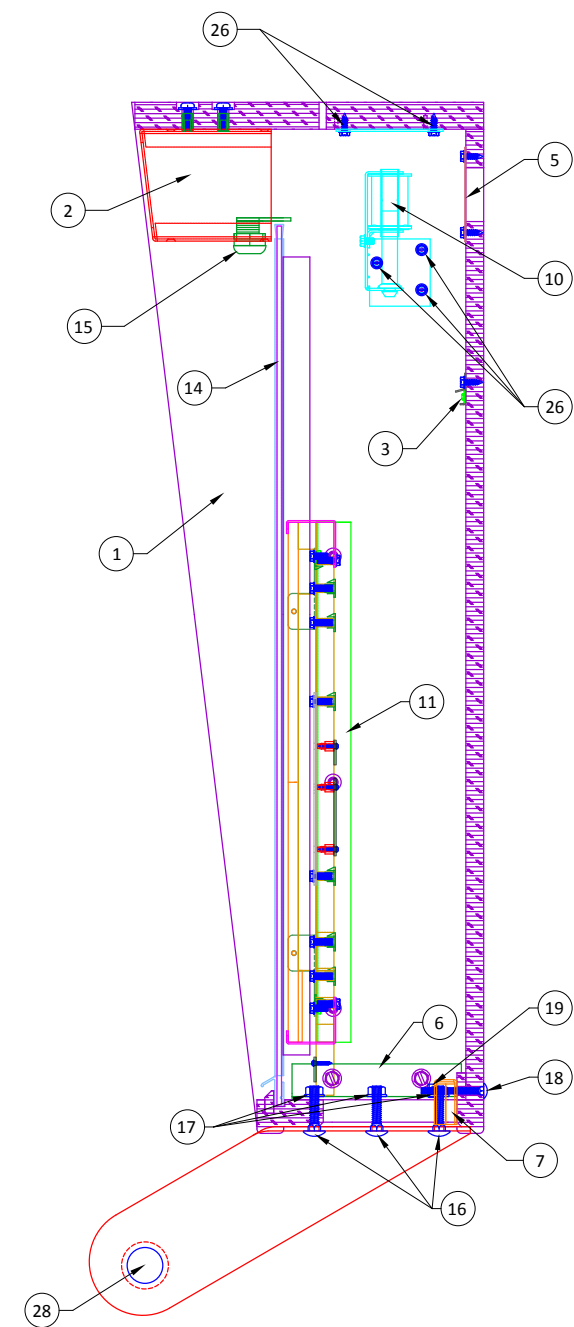
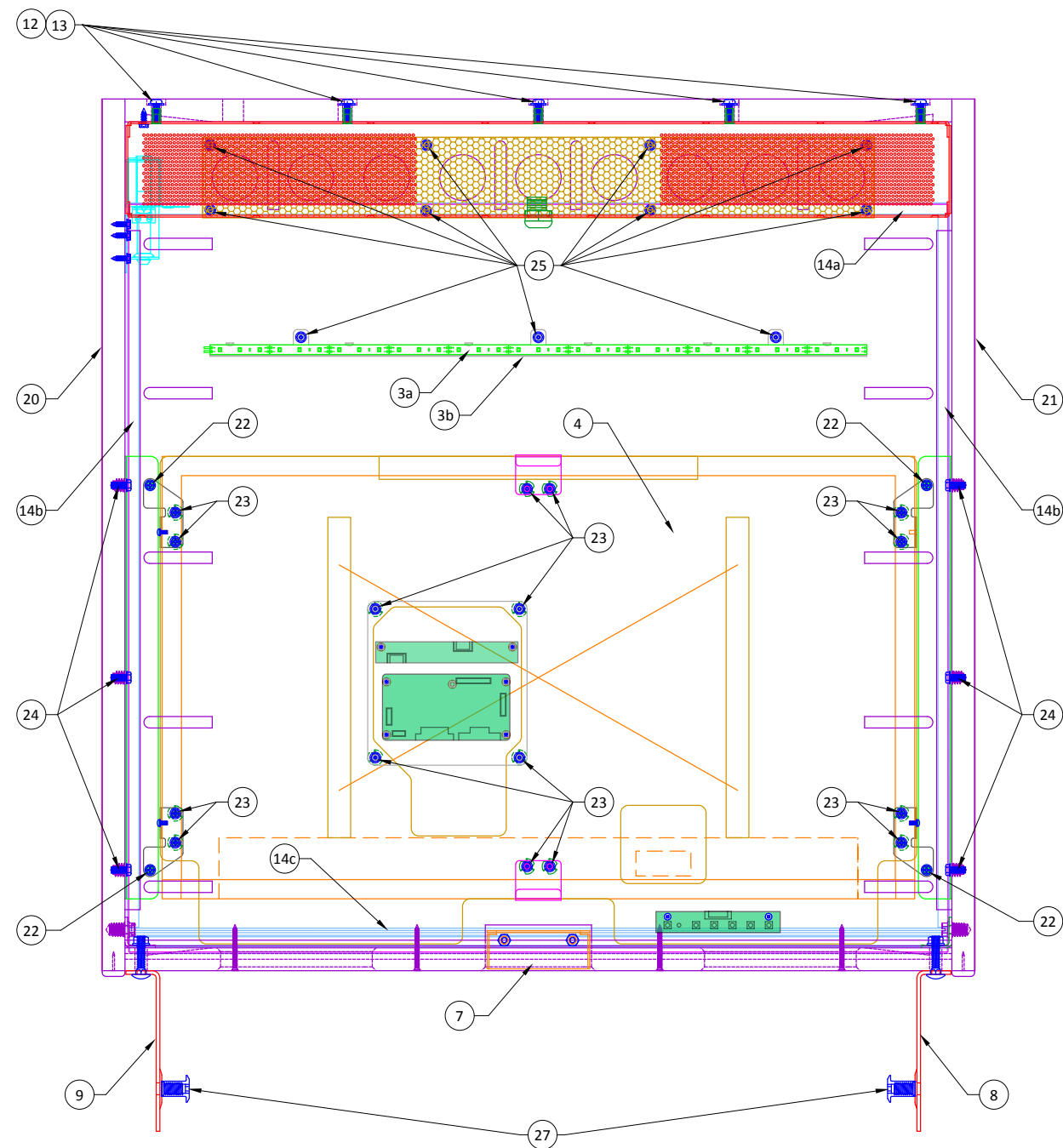
Game Parts Information





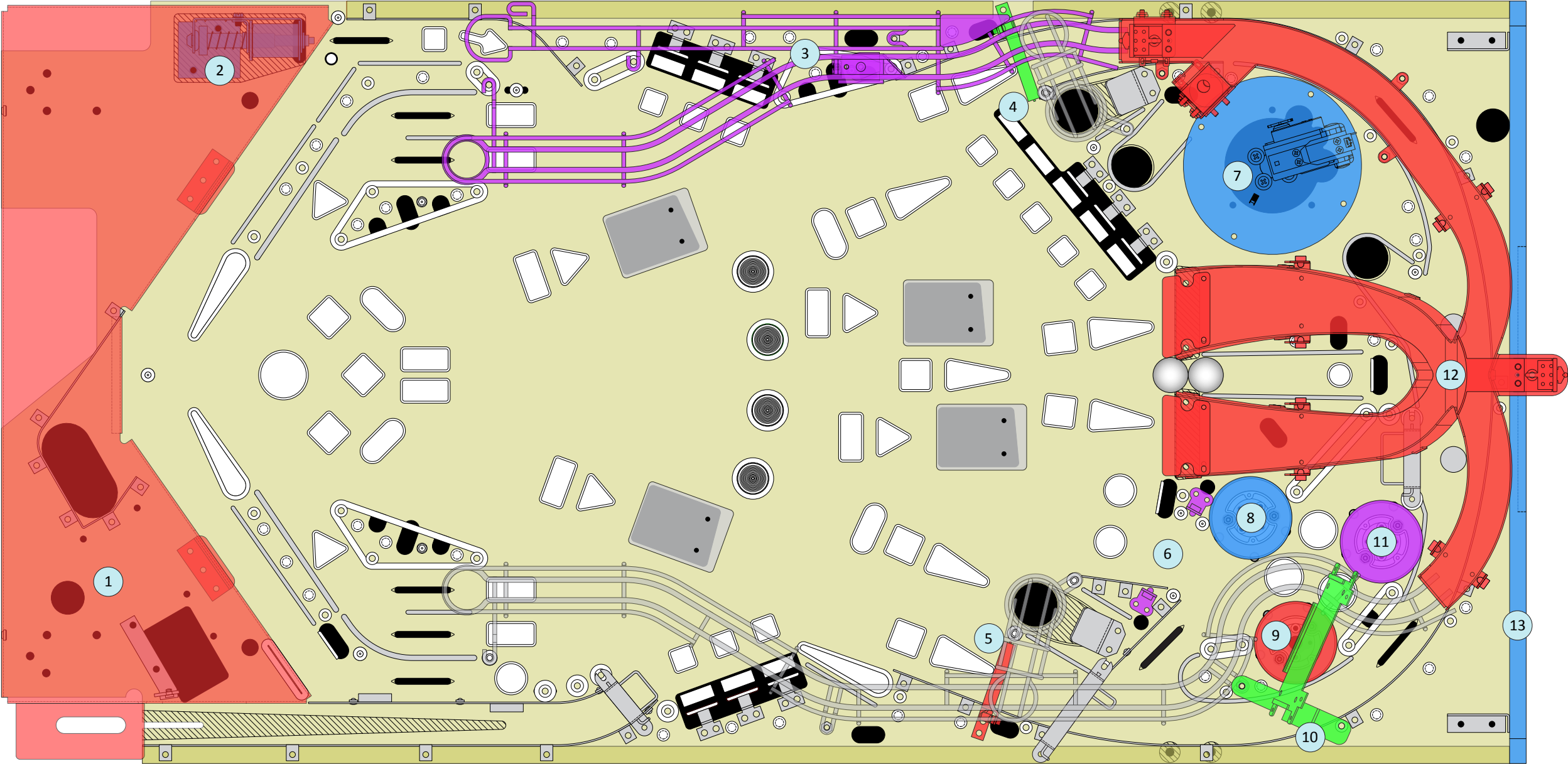
Lower Cabinet Assembly 50-5007-00

Item	Part Number	Description	Qty	Drawing	Item	Part Number	Description	Qty
1	10-0003-01	Cabinet Vent Hole Grill, 3"	4		NS	10-0133-00	Cabinet Leg Brkt, Decal Protector	4
2	98-0002-00	Rubber Flex Latch	2		20	10-0006-00	Cabinet Leg Mtg Brkt	4
3	15-5000-02	Cabinet PCB Chassis Assy, HOB	1	C-14	21	LE 42-7003-05	Cabinet Side Rail, Bronze Vein	2
4	16-5000-01	Main Transformer	1			SE 42-7003-06	Cabinet Side Rail, Gold Vein	2
5	18-7023-04	Start Button Switch Assy, Recessed, Yellow	1			BA 42-7003-09	Cabinet Side Rail, Black River	2
6	18-0005-00	Flipper Leaf Switch, Single Contact (Left)	1			Std 42-7003-01	Cabinet Side Rail, Stainless	2
NS	18-0005-01	Flipper Leaf Switch, Double Contact (Right)	1		NS	30-8000-00	Cabinet Side Glass Channel	2
7	18-7009-04	Flipper Button Assy, Yellow	2		NS	60-0002-01	Widebody Playfield Invisiglass®	1
a)	30-0009-04	Flipper Button, Yellow	2			Std 60-0002-00	Widebody Playfield Glass	1
b)	91-0001-10	Flipper Button PAL Nut	2		22	30-8001-01	Cabinet Rear Glass Channel, Wide	1
8	40-0001-00	25¢ USA Coin Door Assy	1		23	10-0185-01	Playfield Support/Slide Brkt w/Bearing, Left	1
9	42-5001-00	Roto-Lock Latch	1		NS	10-0185-00	Playfield Support/Slide Brkt w/Bearing, Right	1
10	51-5027-01	Shaker Motor Assy	1	C-41	24	30-0001-00	Pinball Cashbox, Plastic	1
11	51-0028-00	Plumb Bob Tilt Assy	1	C-33		10-0011-00	Cashbox Cover, Universal	1
12	LE 51-0031-01	Ball Shooter Assy, Bronze Vein	1	C-34	25	51-5023-00	Line Filter Box Assy	1
	SE 51-0031-02	Ball Shooter Assy, Gold Vein	1	C-34	26	10-0010-00	Line Cord Cover Plate	1
	BA 51-0031-04	Ball Shooter Assy, Black River	1	C-34	27	17-6002-00	Subwoofer Speaker, 4 Ω	1
	Std 51-0031-03	Ball Shooter Assy, Chrome	1	C-34	28	10-0002-00	Cabinet Speaker Grill, 8"	1
13	10-0186-00	Jack In The Back Cover Plate	1		29	19-9000-00	Line Power Cable, USA	1
14	51-0035-00	Door & Interlock Switch Assy	1		30	18-7009-13	Flipper Button Assy, Clear	1
a)	10-0089-00	Door & Interlock Switch Brkt	1		a)	30-0009-13	Flipper Button, Clear	1
b)	18-3007-01	Safety Interlock Switch, 2/16	1		b)	91-0001-10	Flipper Button PAL Nut	1
c)	18-3008-00	Coin Door Switch	1		NS	61-0003-00	Hobbit Std/LE Cabinet Decal, Left Side	1
15	51-5001-00	Power Box Assy	1	C-39		SE 61-0005-00	Hobbit SE Cabinet Decal, Left Side	1
16	18-7012-00	On/Off Switch Assy	1			BA 61-0003-01	Hobbit BA Cabinet Decal, Left Side	1
17	LE 51-0067-00	Lockdown Bar Assy, Wide, w/Button Hole, Bronze Vein	1		NS	61-0004-00	Hobbit Std/LE Cabinet Decal, Right Side	1
	SE 51-0067-01	Lockdown Bar Assy, Wide, w/Button Hole, Gold Vein	1			SE 61-0006-00	Hobbit SE Cabinet Decal, Right Side	1
	BA 51-0067-03	Lockdown Bar Assy, Wide, w/Button Hole, Black River	1			BA 61-0004-01	Hobbit BA Cabinet Decal, Right Side	1
	Std 51-0067-02	Lockdown Bar Assy, Wide, w/Button Hole, Stainless	1		NS	61-3002-00	Hobbit Std/LE Cabinet Decal, Front	1
18	10-8001-00	Lockdown Bar Receiver Assy, Notched	1	C-10		SE 61-3003-00	Hobbit SE Cabinet Decal, Front	1
19	LE 10-0001-05	Cabinet Leg Assy, Bronze Vein	4			BA 61-3002-01	Hobbit BA Cabinet Decal, Front	1
	SE 10-0001-06	Cabinet Leg Assy, Gold Vein	4					
	BA 10-0001-07	Cabinet Leg Assy, Black River	4					
	Std 10-0001-02	Cabinet Leg Assy, Chrome	4					



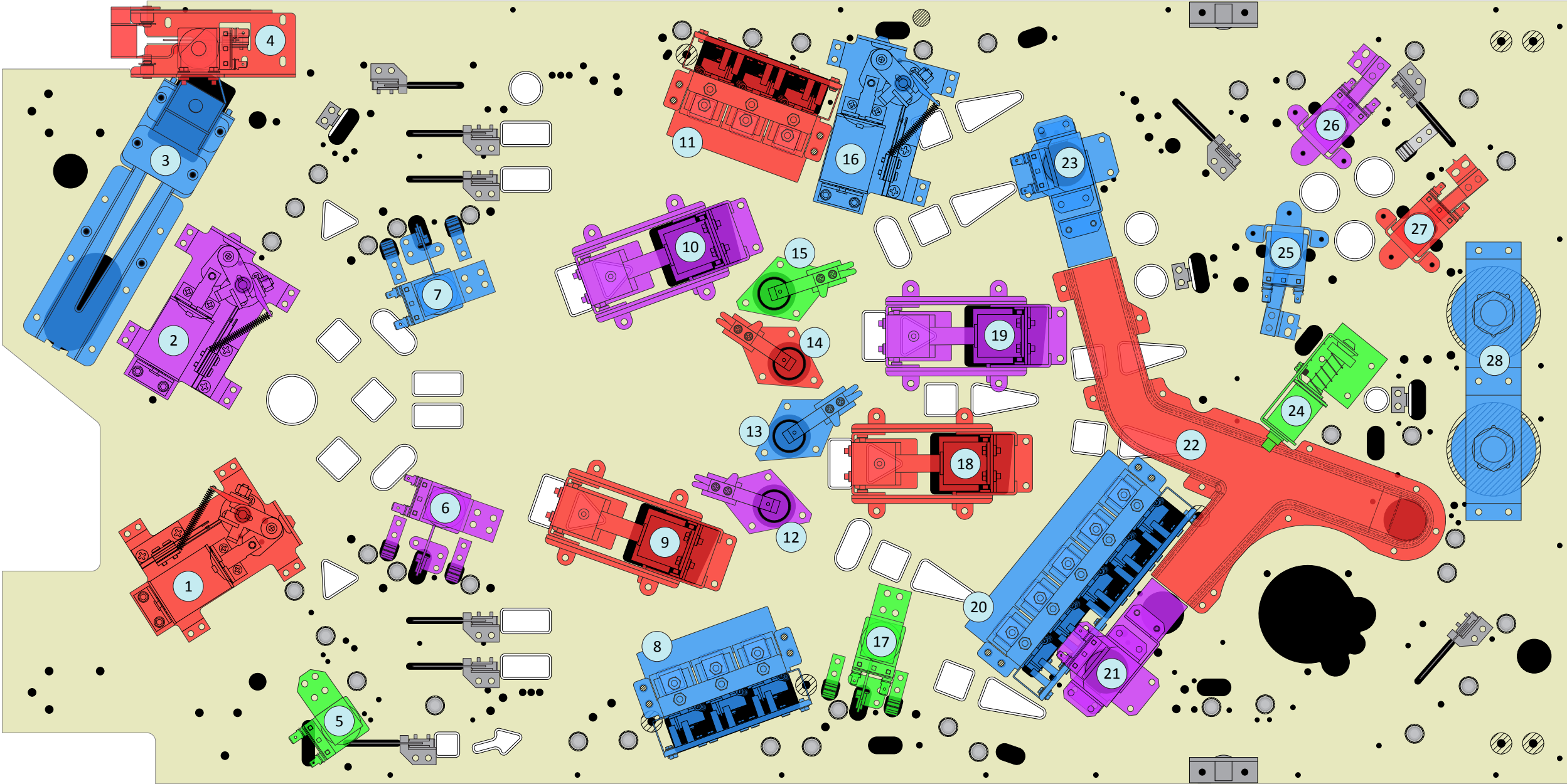
Backbox Assembly 50-5006-00

Item	Part Number	Description	Qty	Drawing	Item	Part Number	Description	Qty
1	05-2002-00	Backbox Wood	1		14	51-5033-00	Hobbit Backbox Printed Glass Assy	1
2	51-5010-01	Backbox Speaker Bar Assy	1	C-40	a)	30-8002-00	Backglass Top Plastic Channel, 26-15/16"	1
3	51-5011-00	Backbox Light Assy	1		b)	30-8002-01	Backglass Side Plastic Channel	2
a)	10-0109-00	Backbox Light Strip Mtg Brkt	1		c)	30-8004-00	Backglass Lift Channel	1
b)	24-0001-13	LED Strip, Cool White	1		NS	60-0004-00	Hobbit Printed Backglass	1
4	51-5032-00	27" LCD Panel Assy	1	C-44	15	51-5012-00	Backbox Lock Assy	1
5	10-0003-00	Cabinet Vent Hole Grill, 2-3/8" x 22"	1		16	81-5125-20	1/4-20 x 1-1/4" Carriage Bolt, Black	6
6	10-0034-00	Backbox Inner Corner L Brkt	2		17	91-2025-00	1/4-20 Flange Nut	6
7	42-5002-00	Roto-Lock Receptacle	1		18	81-5011-28	10-24 x 1-3/4" Carriage Bolt, Black	2
8	LE 42-7001-10	Backbox Right Mtg Hinge, Bronze Vein	1		19	91-0011-00	10-24 Nylon Stop Nut	2
	SE 42-7001-12	Backbox Right Mtg Hinge, Gold Vein	1		20	61-6003-00	Hobbit Backbox Decal, Left Side	1
	BA 42-7001-18	Backbox Right Mtg Hinge, Black River	1		BA	61-6003-01	Hobbit BA Backbox Decal, Left Side	1
	Std 42-7001-00	Backbox Right Mtg Hinge, Black	1		21	61-6004-00	Hobbit Backbox Decal, Right Side	1
9	LE 42-7001-11	Backbox Left Mtg Hinge, Bronze Vein	1		BA	61-6004-01	Hobbit BA Backbox Decal, Right Side	1
	SE 42-7001-13	Backbox Left Mtg Hinge, Gold Vein	1		22	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	4
	BA 42-7001-19	Backbox Left Mtg Hinge, Black River	1		23	80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	16
	Std 42-7001-01	Backbox Left Mtg Hinge, Black	1		24	80-2010-08	10-32 x 1/2" HWH Phillips MS, Serrated	6
10	51-0032-01	Knocker Assy, Vertical	1	C-35	25	82-2008-06	#8 x 3/8" HWH Phillips SMS	11
11	10-0139-00	27" LCD Panel Assy Mtg Brkt	2		26	82-2008-08	#8 x 1/2" HWH Phillips SMS	5
12	80-8110-10	10-32 x 5/8" TP Torx MS, Black	5		27	85-3816-00	3/8-16 x 3/4" x 1/2" SH T-Nut Pivot Bushing, Black	2
13	92-0010-00	#10 Flat Washer	5		28	85-3816-12	3/8-16 x 3/4" Hinge Bolt, Short Neck, Black	2



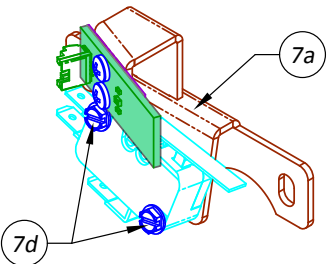
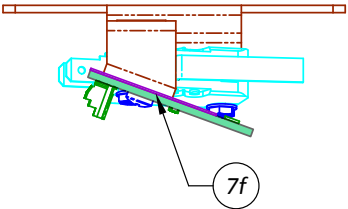
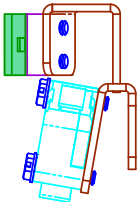
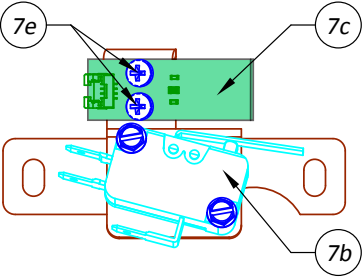
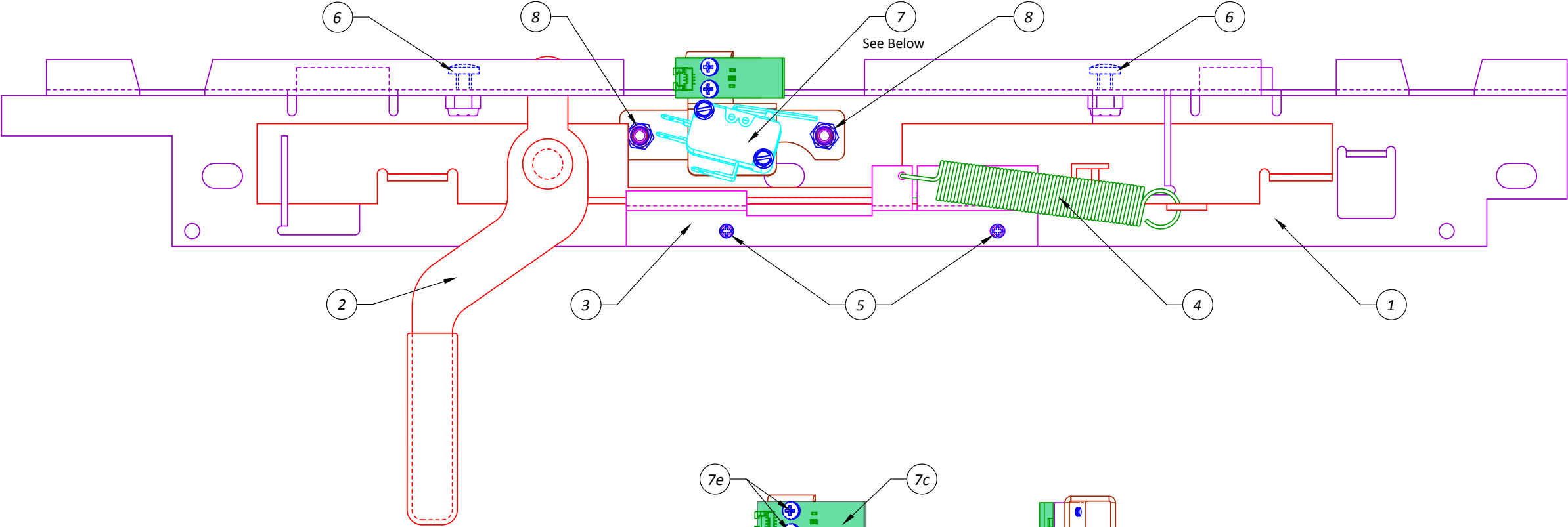
Above-Playfield Assemblies

Item	Part Number	Assembly Name	Game Function	Drawing
1	52-0037-00	Hobbit Bottom Arch Assembly	Playfield Bottom Arch	C-43
2	51-0025-00	Kickback Assembly, Left Mount	Windlance/Kickback	C-31
3	13-2002-02	Hobbit Left Wire Ramp Assembly, Chrome	Ball Return/Windlance Feed	C-13
4	18-7002-02	Left Opto Spinner Assembly	Fili Spinner	C-16
5	18-7002-01	Right Opto Spinner Assembly	Kili Spinner	C-16
6	51-0071-00	Playfield Opto Pair Assembly	Bag End Switch	C-38
7 LE	52-0038-00	Smaug Assembly, Red	Smaug Character	C-46
SE	52-0038-01	Smaug Assembly, Gold		C-46
Std	52-0038-00	Smaug Assembly, Red		C-46
8	11-5004-01	Pop Bumper Ring & Rod Assembly	Left Pop Bumper	C-12
	51-0006-09	Pop Bumper Top Assembly, White		C-23
9 LE	51-0069-00	Right Jump Bumper Barrel Assembly	Right Barrel Bumper	C-37
SE	51-0069-00	Right Jump Bumper Barrel Assembly	Right Barrel Bumper	C-37
Std	11-5004-01	Pop Bumper Ring & Rod Assembly	Right Pop Bumper	C-12
	51-0006-09	Pop Bumper Top Assembly, White		C-23
10	52-0045-00	Hobbit Book LCD Assembly	Mode Display Book	C-52
11 LE	51-0068-00	Upper Jump Bumper Barrel Assembly	Upper Barrel Bumper	C-37
SE	51-0068-00	Upper Jump Bumper Barrel Assembly	Upper Barrel Bumper	C-37
Std	11-5004-01	Pop Bumper Ring & Rod Assembly	Upper Pop Bumper	C-12
	51-0006-09	Pop Bumper Top Assembly, White		C-23
12	52-0042-00	Hobbit Steel Ramp Assembly	Gandalf/Bilbo Ramps, Multiball Locks	C-48
13	51-5031-00	Hobbit Back Panel Assembly	Playfield Backdrop	C-42



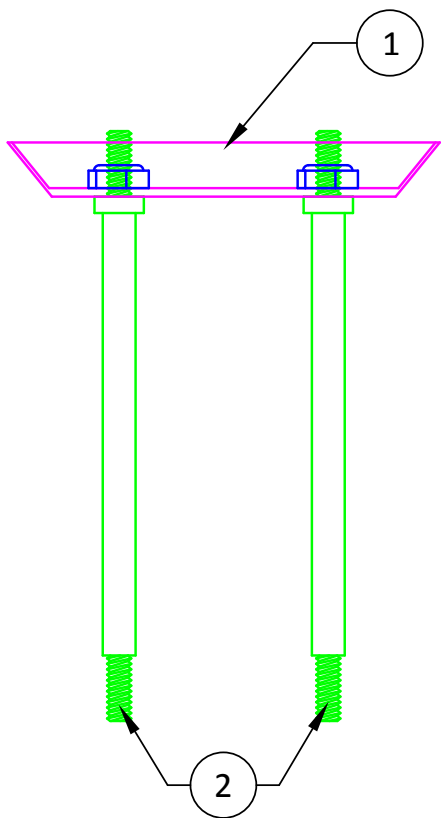
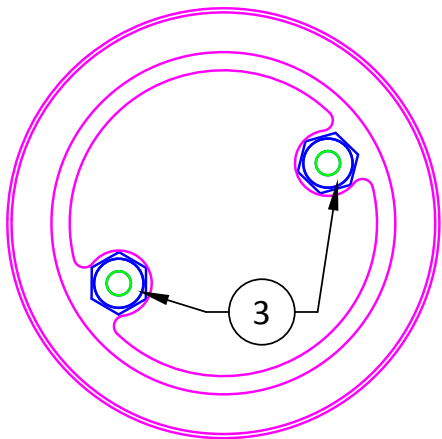
Under-Playfield Assemblies

Item	Part Number	Assembly Name	Game Function	Drawing
1	51-0002-00	Left Flipper Assembly	Left Flipper	C-19
2	51-0001-00	Right Flipper Assembly	Right Flipper	C-18
3	51-0021-00	5-Ball Trough Assembly	Ball Trough, VUK	C-30
4	51-0026-00	Auto-Launch Assembly	Ball Auto-Launch	C-32
5	51-0030-00	Disappearing Post Assembly	Windlance Up Post	C-33
6	51-0003-01	Hobbit Left Slingshot Assembly	Left Slingshot	C-20
7	51-0003-02	Hobbit Right Slingshot Assembly	Right Slingshot	C-20
8	51-0015-01	3-Bank Drop Target Assembly, Left	ELF Drop Targets	C-26
9	52-0044-00	Hobbit Spider Pop-Up Assembly	Spider Pop-Up	C-50
10	52-0044-01	Hobbit Warg Pop-Up Assembly	Warg Pop-Up	C-50
11	51-0015-00	3-Bank Drop Target Assembly, Right	MAN Drop Targets	C-26
12	18-7003-00	Rollover Button Switch Assembly	LOCK Rollover	C-16
13	18-7003-00	Rollover Button Switch Assembly	LOCK Rollover	C-16
14	18-7003-00	Rollover Button Switch Assembly	LOCK Rollover	C-16
15	18-7003-00	Rollover Button Switch Assembly	LOCK Rollover	C-16
16	51-0001-13	Right Flipper Assembly, Mod-LL	Upper Right Flipper	C-18
17	51-0003-03	Slingshot Assembly	Upper Slingshot	C-20
18	52-0044-02	Hobbit Goblin Pop-Up Assembly	Goblin Pop-Up	C-50
19	52-0044-03	Hobbit Orc Pop-Up Assembly	Orc Pop-Up	C-50
20	51-0017-00	5-Bank Drop Target Assembly	DWARF Drop Targets	C-28
21	51-0012-01	VUK/Steel Trough Assembly, Left Mount	Balin VUK	C-25
22	31-5011-00	Hobbit Subway Assembly	Subway	C-17
23	51-0012-00	VUK/Steel Trough Assembly, Right Mount	Radagast VUK	C-24
24	51-0048-00	Subway Diverter Assembly	Subway Diverter	C-36
25	51-0004-01	Pop Bumper Bottom Assembly	Left Pop Bumper	C-22
26	51-0004-01	Pop Bumper Bottom Assembly	Right Pop Bumper	C-22
27	51-0004-01	Pop Bumper Bottom Assembly	Upper Pop Bumper	C-22
28	51-0046-00	Dual Magnet Assembly	Top Magnets, Left & Right	C-36



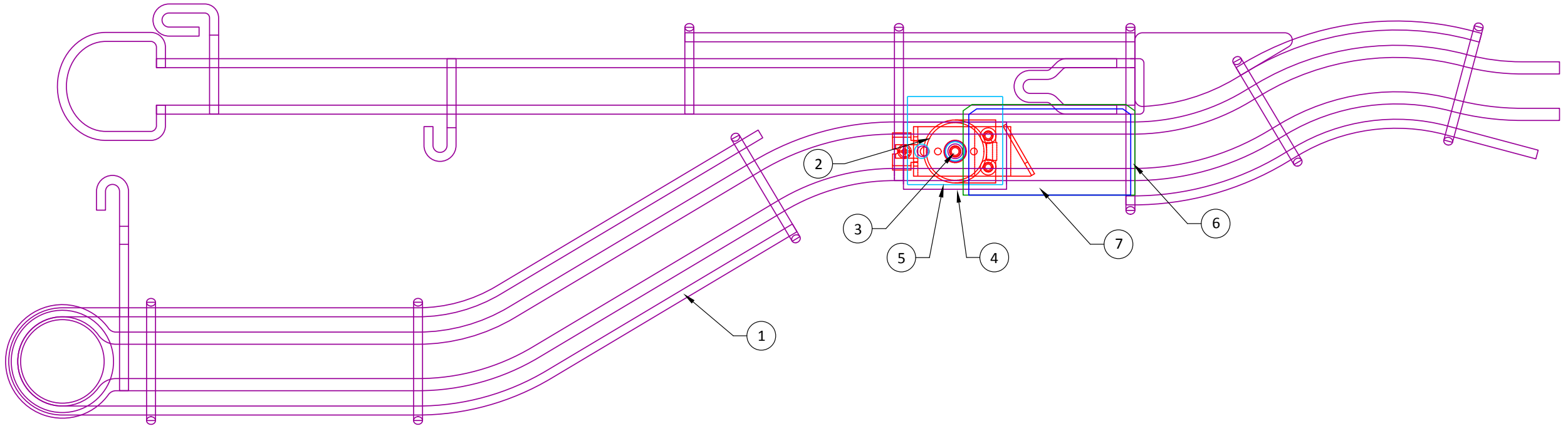
Lockdown Bar Receiver Assembly, Notched 10-8001-00

Item	Part Number	Description	Qty
1	10-5029-00	Lockdown Bar Receiver Brkt Assy, Notched	1
2	10-5030-00	Lockdown Bar Receiver Lever Assy, Notched	1
3	10-0157-00	Lockdown Bar Receiver Slide Support, Notched	1
4	13-7017-00	Lockdown Bar Receiver Spring	1
5	80-1006-04	6-32 x 1/4" PPH MS, SEMS	2
6	80-0310-10	10-32 x 5/8" Slot Head MS, Brass	2
7	51-0066-00	Lockdown Bar Switch Assy	1
a)	10-0167-00	Lockdown Bar Switch Brkt	1
b)	18-3015-00	Mini Switch w/Straight Blade Actuator	1
c)	15-0028-0X	Single RGB LED Bd	1
d)	80-2104-08	4-40 x 1/2" HWH MS, Black	2
e)	80-0004-03	4-40 x 3/16" PPH MS	2
f)	70-9010-00	RGB LED Bd Insulator, Fish Paper	1
8	91-0008-00	8-32 Nylon Stop Nut	2



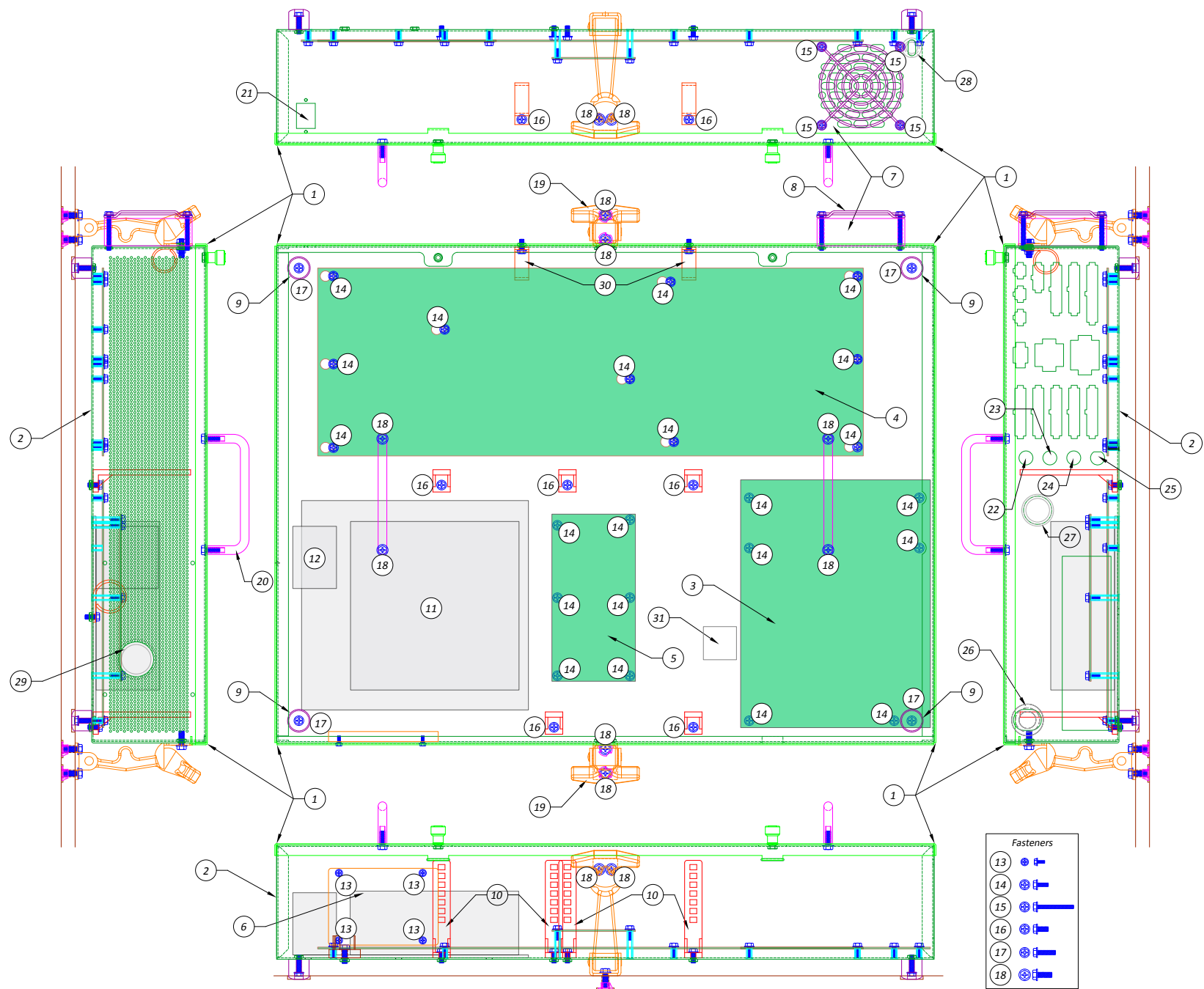
Pop Bumper Ring & Rod Assembly
11-5004-01

Item	Part Number	Description	Qty
1	11-0005-00	Pop Bumper Ring	1
2	11-0008-00	Pop Bumper Rod	2
3	91-0006-00	6-32 Nylon Stop Nut	2



Hobbit Left Wire Ramp Assembly 13-2002-02

Item	Part Number	Description	Qty
1	13-0008-01	Hobbit Left Wire Ramp, Chrome	1
2	51-5038-00	Windlance Diverter Assy	1
3	80-6006-04	6-32 x 1/4" PFH MS, w/Undercut	1
4	62-0011-28	Hobbit Windlance Diverter Decal	1
5	70-9002-01	Mini Coil Insulator, Fish Paper	1
6	30-0112-00	Diverter Shield, Lasered	1



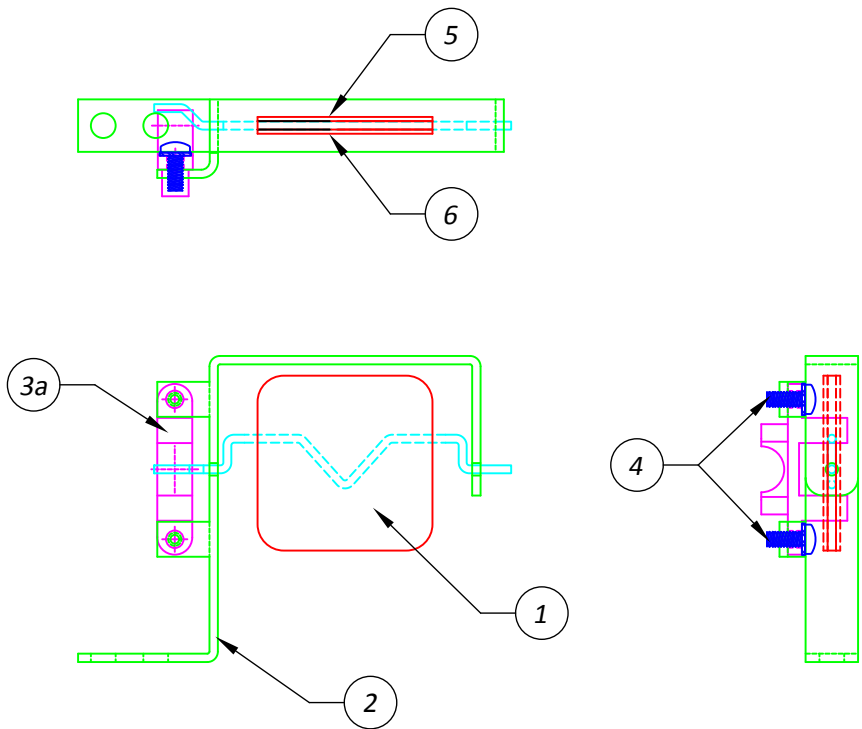
Cabinet PCB Chassis Assembly, HOB

15-5000-02

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	10-0030-00	Electronic PCB Chassis Lid	1	14	80-2006-06	6-32 x 3/8" HWH Phillips MS, Serrated	22
2	10-5014-00	Electronic PCB Chassis	1	15	80-2006-20	6-32 x 1-1/4" HWH Phillips MS, Serrated	4
3	15-0000-01	CPU Bd, H81M-P133	1	16	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	7
	15-0014-00	Intel Celeron CPU G530 2.4GHz Processor	1	17	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	4
	15-0012-02	8GB Memory Module	1	18	80-2010-08	10-32 x 1/2" HWH Phillips MS, Serrated	12
or	15-0012-00	4GB Memory Module	2	19	98-0002-00	Rubber Flex Latch	2
4	15-4001-01	I/O Bd PCB Assy, HOB	1	20	98-0003-00	1-1/2" Metal Handle, 1/4" Round, 10-32	2
	19-5007-00	I/O Bd Right Output Cable, 10/15	1	21	22-8005-00	RJ45 Bulkhead Coupler, F-F	1
	19-5007-01	I/O Bd Left Output Cable, 10/15	1	22	22-8004-04	RCA Bulkhead Jack, Yellow, F-F	1
	19-9005-02	I/O Bd AC Input Cable	1	23	22-8004-09	RCA Bulkhead Jack, White, F-F	1
5	15-0002-00	Sound Amplifier Bd	1	24	22-8004-02	RCA Bulkhead Jack, Red, F-F	1
6	15-0003-00	Solid State Drive, 32GB	1	25	22-8003-00	3.5mm Bulkhead Jack, F-F	1
7	23-5004-00	Fan, 12VDC Motor, 3.125"	1	26	25-9010-00	PCB Chassis CPU Grommet, Left	1
8	10-0110-00	Fan Guard, 3.125"	1	27	25-9011-00	PCB Chassis Fan Grommet	1
9	25-9007-00	PCB Chassis Rubber Foot	4	28	25-9013-00	PCB Chassis CPU Grommet, 1"	1
10	30-0033-01	Nylon Cable Ladder, 3.5"	5	29	30-0108-01	Locking Grommet, 1-1/4"	1
11	16-0011-00	Primary ATX Power Supply, 460W, w/24VDC	1	30	30-0049-12	Nylon Cable Clamp, Open, 3/4"	2
12	16-0010-00	7.5/4VDC Power Supply	1	31	195-0000-00	CPU Bd Ferrite	1
13	80-2104-04	4-40 x 1/4" HWH MS, Black	4				

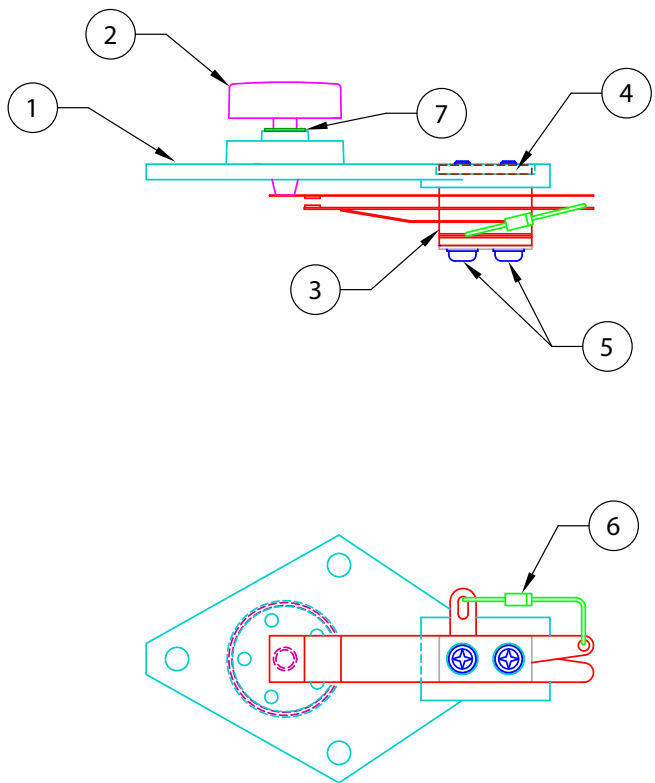
Right & Left Opto Spinner Assemblies
18-7002-01, 18-7002-02

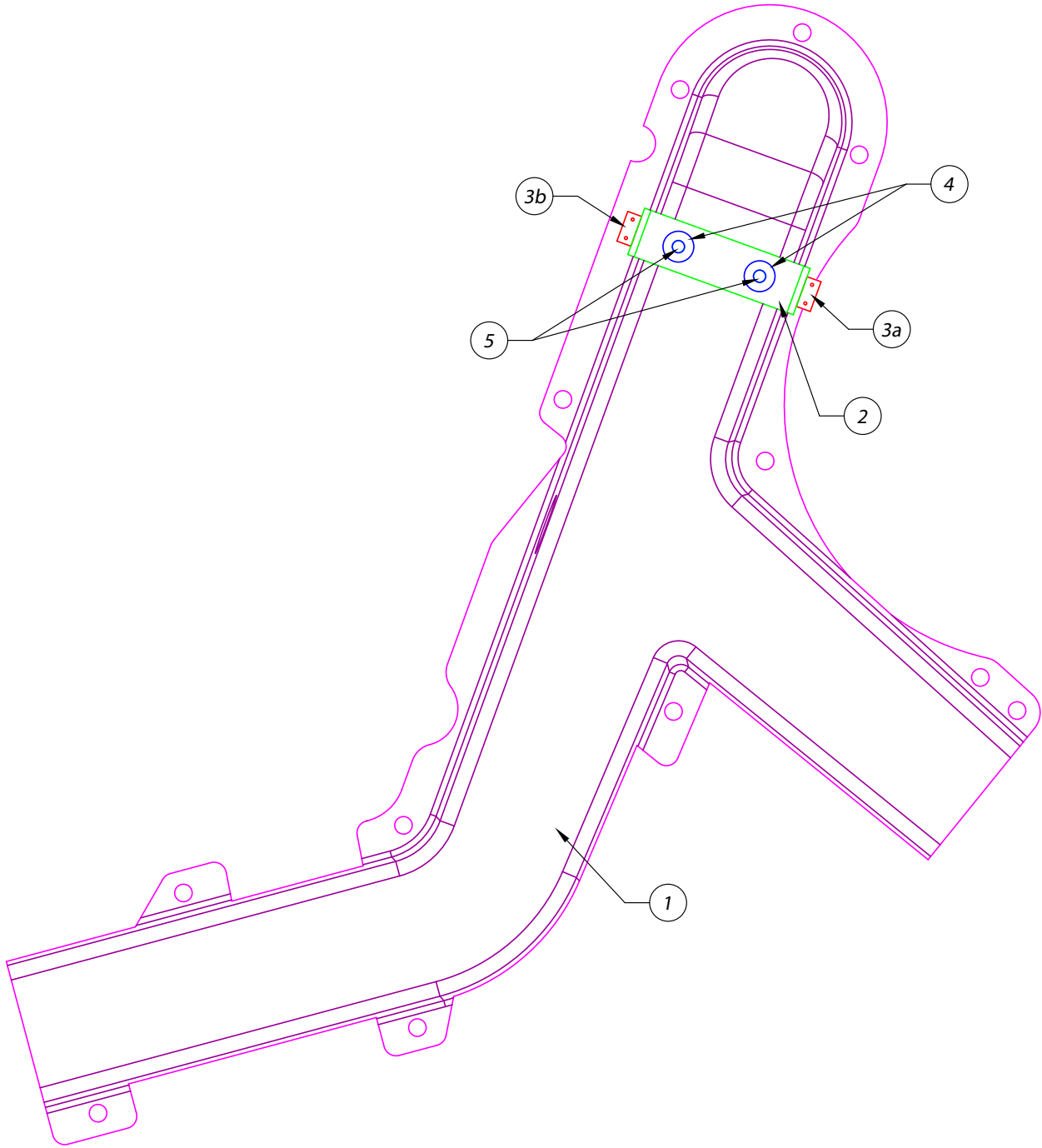
Item	Part Number	Description	Qty
1	10-0068-01	Opto Spinner Tgt Assy	1
2	10-5013-02	Opto Spinner Mtg Brkt	1
3	18-7021-24-06	U-Shaped Opto Assy, OPB812W, 24" Cable, BLU (-01)	1
a)	18-5003-00	U-Shaped Opto, OPB812W	1
	18-7021-21-07	U-Shaped Opto Assy, OPB812W, 21" Cable, VIO (-02)	1
a)	18-5003-00	U-Shaped Opto, OPB812W	1
4	80-0004-04	4-40 x 1/4" PPH MS	2
5	62-0011-02	Hobbit Right Spinner Decal, Front (-01)	1
	62-0011-05	Hobbit Left Spinner Decal, Back (-02)	1
6	62-0011-06	Hobbit Right Spinner Decal, Back (-01)	1
	62-0011-01	Hobbit Left Spinner Decal, Front (-02)	1



Rollover Button Switch Assembly
18-7003-00

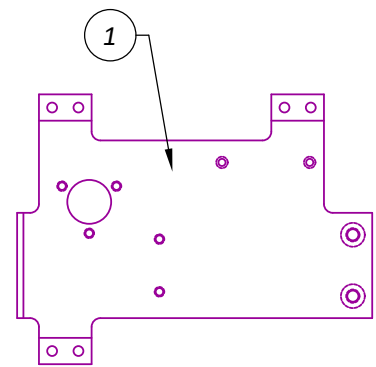
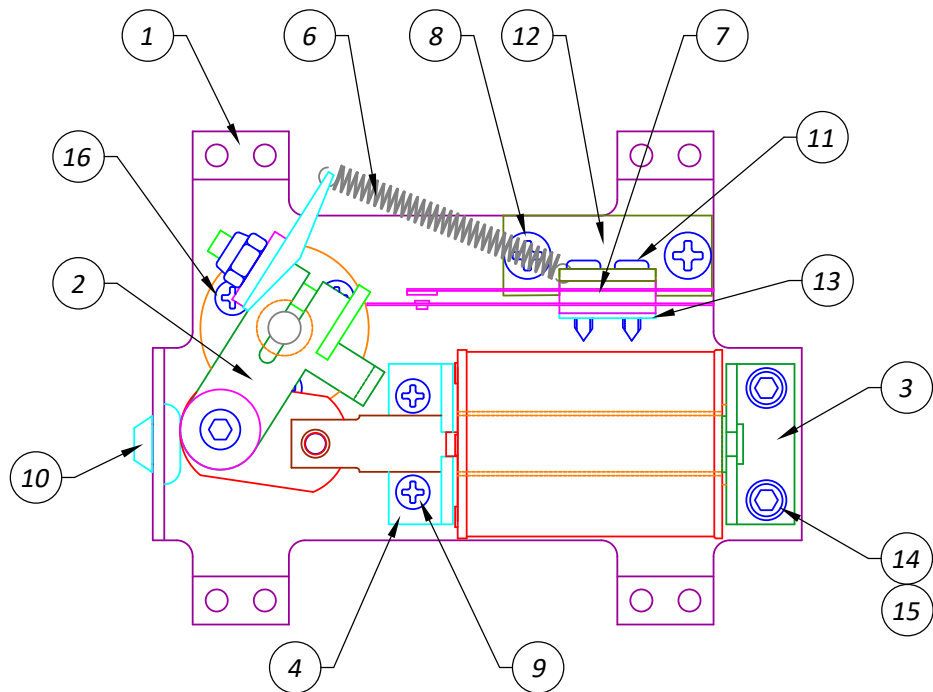
Item	Part Number	Description	Qty
1	30-0010-00	Rollover Base, Plastic	1
2	30-0008-13	Rollover Button, Clear	1
3	18-0004-00	Rollover Button Leaf Switch	1
4	10-0024-02	Switch Nut Plate, 5-40	1
5	80-2005-10	5-40 x 5/8" HWH Phillips MS, Serrated	2
6	110-0002-0T	Diode, 1N4004, 400V, 1A	1
7	92-0630-00	Nylon Washer, 0.22" x 0.32" x 0.032"	1



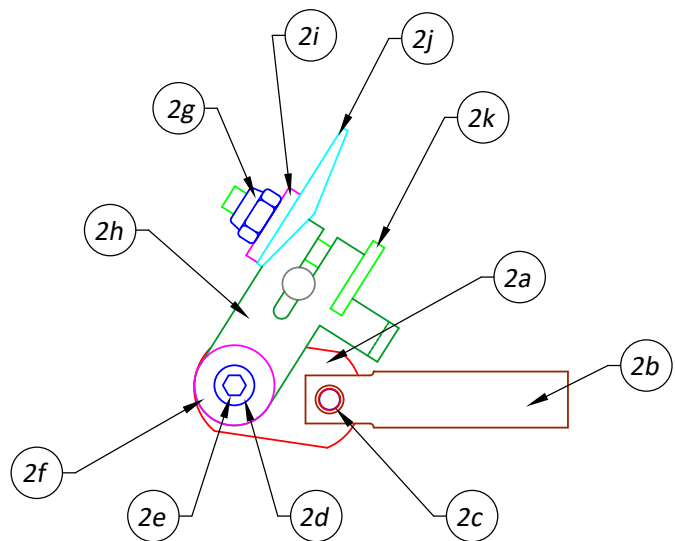
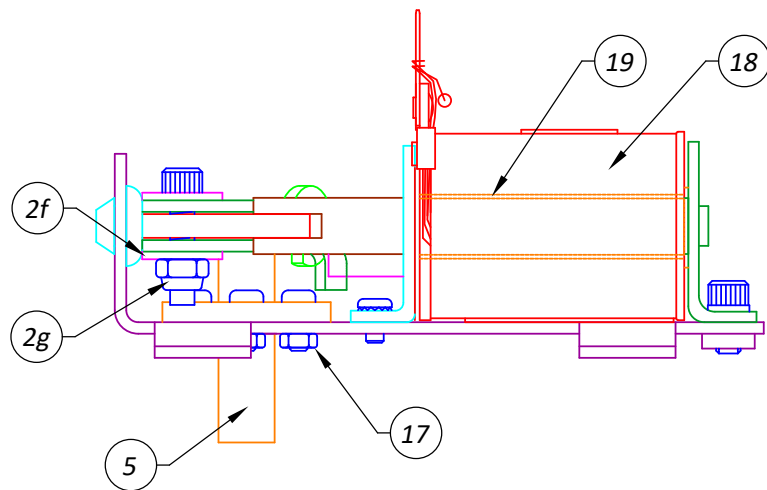


Hobbit Subway Assembly
31-5011-00

Item	Part Number	Description	Qty
1	31-0003-00	Hobbit Plastic Subway, Black	1
2	10-0146-00	Subway Opto Brkt	1
3	18-7020-08-06	Opto Pair, 8" Cable, BLU	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1
4	92-0004-00	#4 Flat Washer	2
5	93-0000-00	1/8" x 7/32" Semi-Tubular Rivet, TH	2



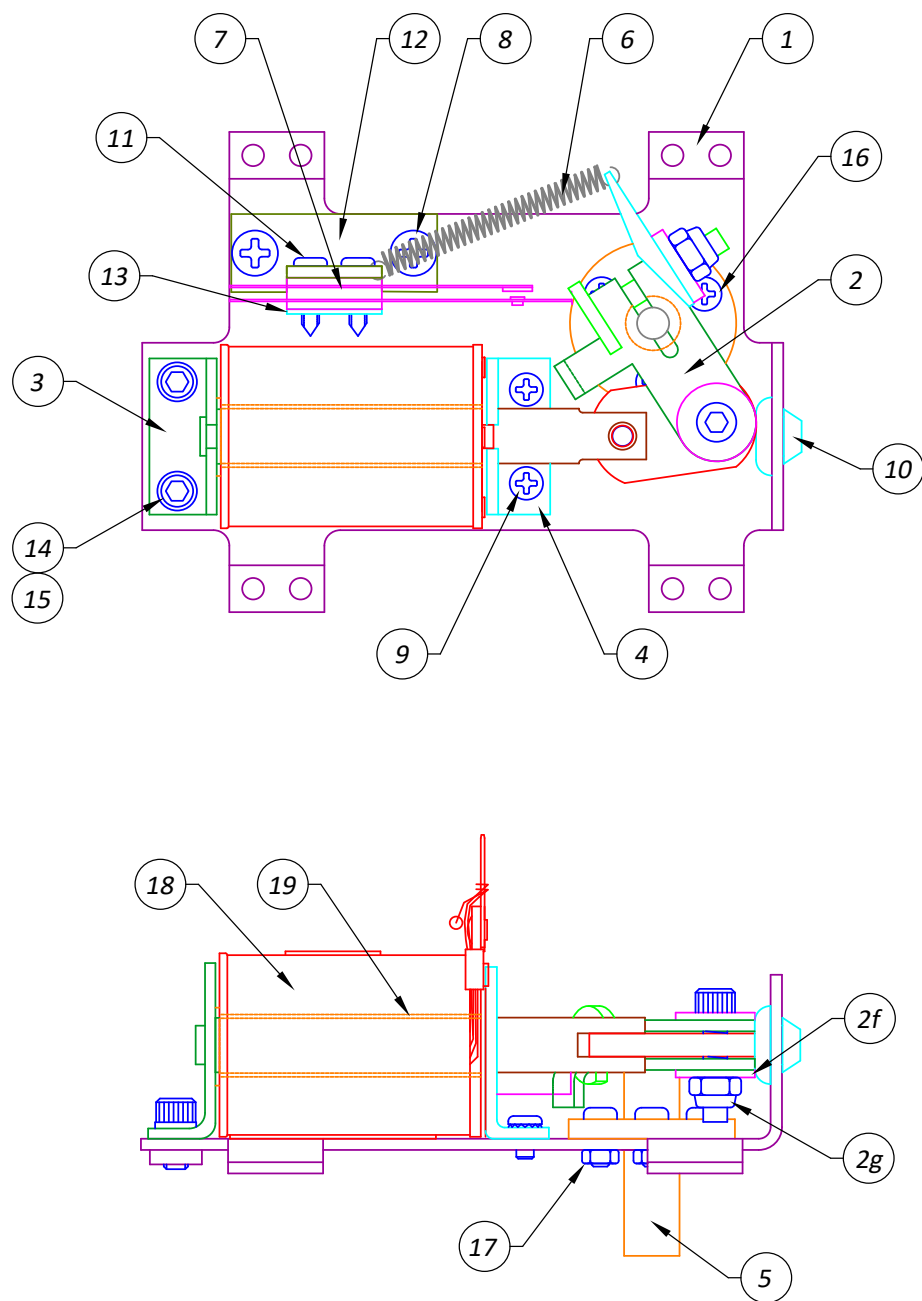
Modified Base Plate (-13)



Right Flipper Assembly, 51-0001-00

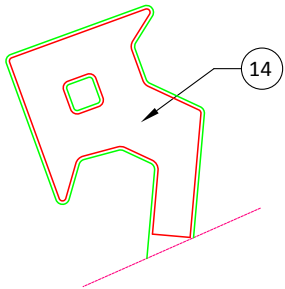
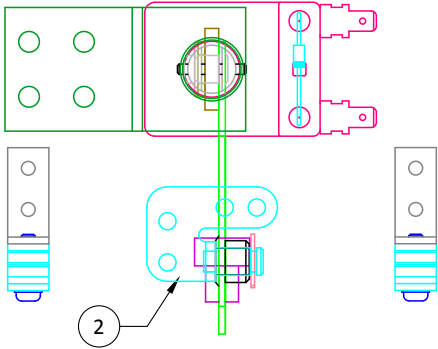
Right Flipper Assembly, Mod-LL, 51-0001-13

Item	Part Number	Description	Qty
1	10-5001-00	Flipper Base Plate, Right (-00, Right)	1
	or 10-5001-13	Flipper Base Plate, Right, Mod-LL (-13, Upper Right)	1
2	51-5018-00	Flipper Crank & Link Assy, Right	1
a)	30-9003-00	Flipper Link	1
b)	11-0003-00	Flipper Plunger	1
c)	94-4002-00	5/32" x 7/16" Roll Pin	1
d)	94-3001-00	Flipper Crank & Link Bushing	1
e)	90-4010-14	10-32 x 7/8" SH CS	1
f)	92-0010-00	#10 Flat Washer	2
g)	91-0010-00	10-32 Nylon Stop Nut	2
h)	10-0019-00	Flipper Crank, Right	1
i)	92-0010-02	#10 Flat Washer, 0.0975" TH	1
j)	10-0020-00	Flipper Return Spring Brkt	1
k)	90-0001-00	Locking Stud Bolt	1
3	10-7001-00	Flipper Coil Stop Brkt	1
4	10-7002-01	Flipper Coil Centering Brkt, 1-Way	1
5	30-9002-00	Flipper Bushing	1
6	13-7001-00	Flipper Return Spring	1
7	18-0001-00	End Of Stroke Leaf Switch	1
8	80-0008-05	8-32 x 5/16" PPH MS	2
9	80-1006-04	6-32 x 1/4" PPH MS, SEMS	2
10	25-9001-00	Rubber Bumper Plug, Black	1
11	82-0006-08	#6 x 1/2" PPH SMS	2
12	10-0018-00	End Of Stroke Switch Brkt	1
13	91-6000-00	Tinnerman Nut, Leaf Switch Stack	1
14	90-4010-06	10-32 x 3/8" SH CS	2
15	92-1010-00	#10 Split Lock Washer	2
16	80-0006-06	6-32 x 3/8" PPH MS	3
17	91-0006-00	6-32 Nylon Stop Nut	3
for 52-0131-00, Right Flipper Assy, FL-15411			
& 52-0131-13, Right Flipper Assy, Mod-LL, FL-15411, add:			
18	23-2003-00	FL-15411 Flipper Coil	1
19	30-0014-35	2-3/16" Coil Tubing, Straight	1

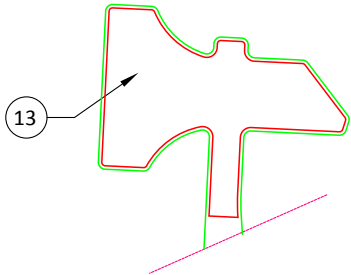


Left Flipper Assembly 51-0002-00

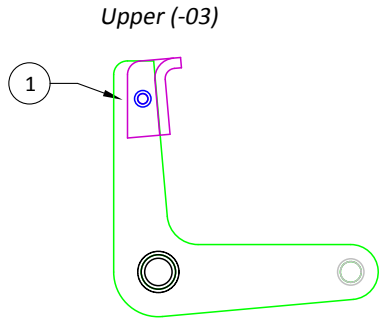
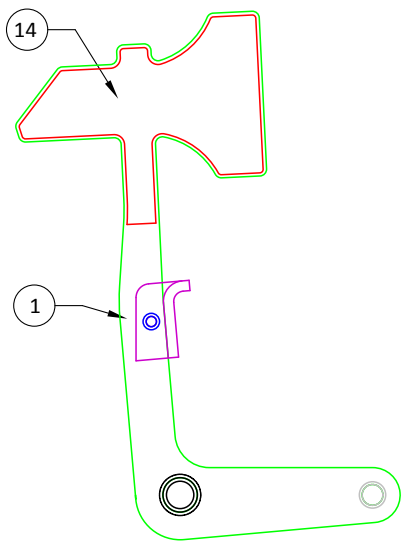
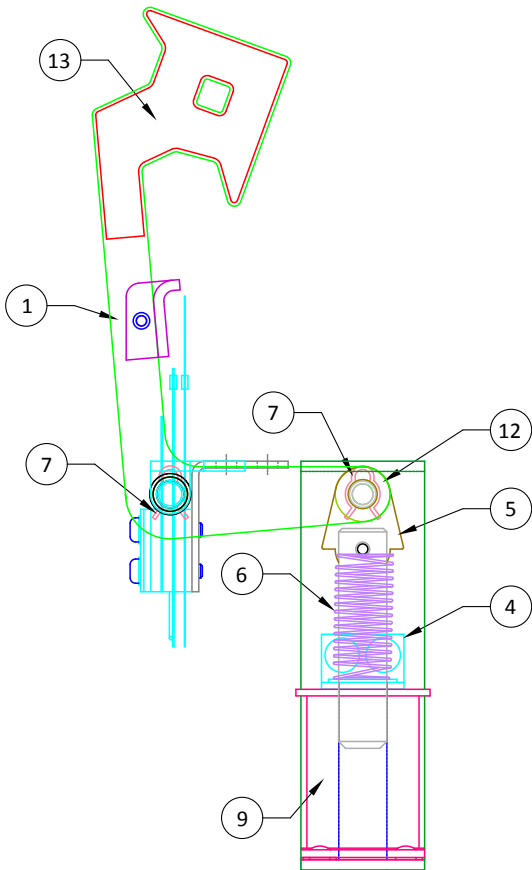
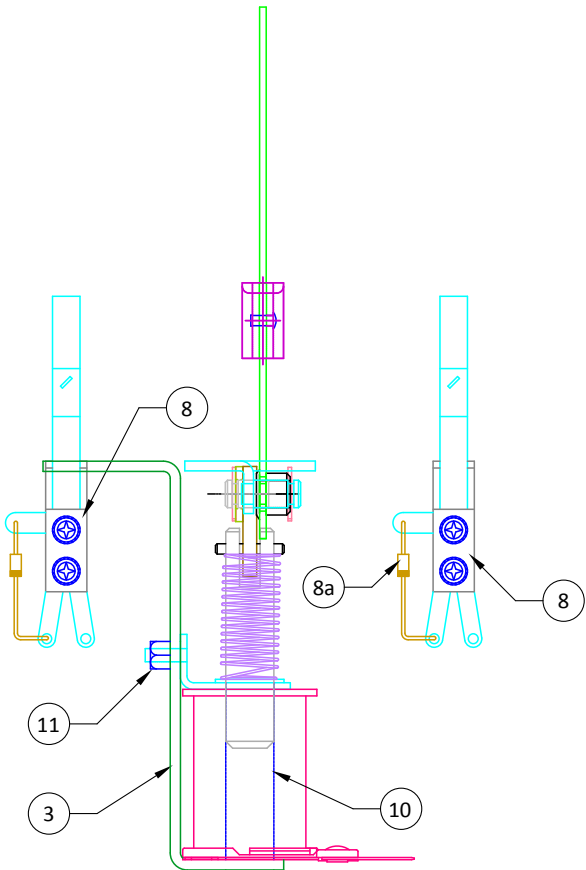
Item	Part Number	Description	Qty
1	10-5002-00	Flipper Base Plate, Left	1
2	51-5018-01	Flipper Crank & Link Assy, Left	1
a)	30-9003-00	Flipper Link	1
b)	11-0003-00	Flipper Plunger	1
c)	94-4002-00	5/32" x 7/16" Roll Pin	1
d)	94-3001-00	Flipper Crank & Link Bushing	1
e)	90-4010-14	10-32 x 7/8" SH CS	1
f)	92-0010-00	#10 Flat Washer	2
g)	91-0010-00	10-32 Nylon Stop Nut	2
h)	10-0019-01	Flipper Crank, Left	1
i)	92-0010-02	#10 Flat Washer, 0.0975" TH	1
j)	10-0020-00	Flipper Return Spring Brkt	1
k)	90-0001-00	Locking Stud Bolt, Flipper Crank	1
3	10-7001-00	Flipper Coil Stop Brkt	1
4	10-7002-01	Flipper Coil Centering Brkt, 1-Way	1
5	30-9002-00	Flipper Bushing	1
6	13-7001-00	Flipper Return Spring	1
7	18-0001-00	End Of Stroke Leaf Switch	1
8	80-0008-05	8-32 x 5/16" PPH MS	2
9	80-1006-04	6-32 x 1/4" PPH MS	2
10	25-9001-00	Rubber Bumper Plug, Black	1
11	82-0006-08	#6 x 1/2" PPH SMS	2
12	10-0018-00	End Of Stroke Switch Brkt	1
13	91-6000-00	Tinnerman Nut, Leaf Switch Stack	1
14	90-4010-06	10-32 x 3/8" SH CS	2
15	92-1010-00	#10 Split Lock Washer	2
16	80-0006-06	6-32 x 3/8" PPH MS	3
17	91-0006-00	6-32 Nylon Stop Nut	3
for 52-0132-00, Left Flipper Assy, FL-15411, add:			
18	23-2003-00	FL-15411 Flipper Coil	1
19	30-0014-35	2-3/16" Coil Tubing, Straight	1



Left Side (-01)



Right Side (-02)

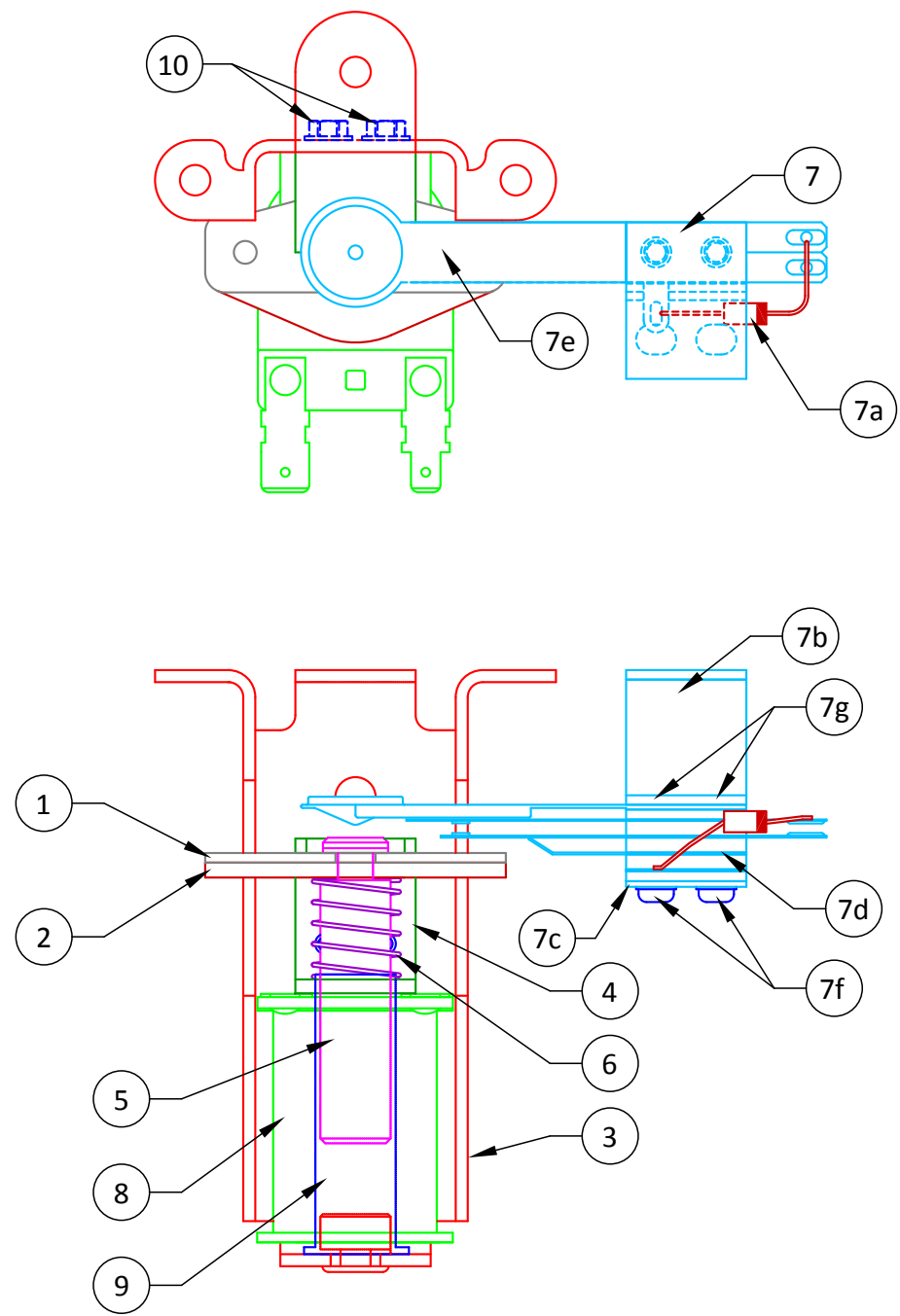


Upper (-03)

Hobbit Slingshot Assemblies

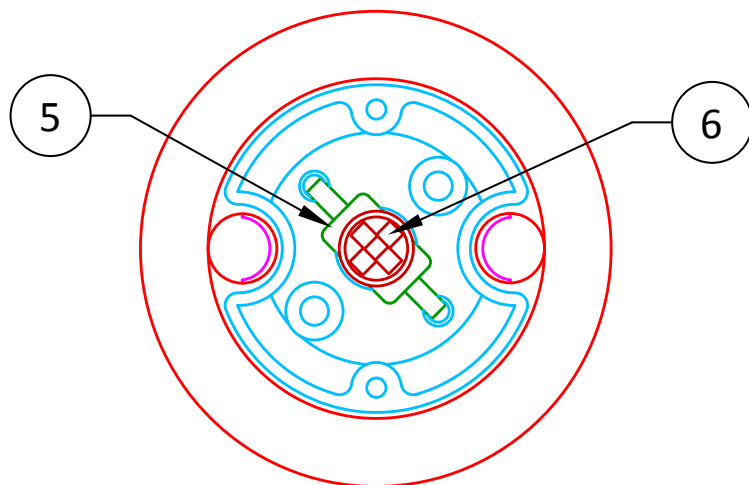
51-0003-01, 51-0003-02, 51-0003-03

Item	Part Number	Description	Qty
1	11-5010-00	Hobbit Left Axe Slingshot Kicker Crank Assy (-01)	1
	11-5011-00	Hobbit Right Axe Slingshot Kicker Crank Assy (-02)	1
	10-0042-00	Slingshot Kicker Crank Assy (-03)	1
2	10-0043-00	Slingshot Kicker Crank Mtg Brkt	1
3	10-5004-00	Slingshot Coil Brkt	1
4	10-7000-01	Coil Centering Brkt, 5/8", 3/8" Mnts, 6-32 Studs	1
5	11-5003-00	Slingshot Plunger & Link Assy	1
6	13-7004-00	Slingshot Plunger Return Spring	1
7	13-9002-00	Hairpin Clip	2
8	18-7008-00	Slingshot Leaf Switch Assy, Front Mount	2
a)	110-0002-0T	Diode, 1N4004, 400V, 1A	2
9	23-0010-00	26-1200 Standard Coil	1
10	30-0014-28	1-3/4" Coil Tubing, Straight	1
11	91-0006-00	6-32 Nylon Stop Nut	2
12	95-2651-20-67	Flat Washer, 0.265" x 0.5" x 0.067"	1
13	62-0011-08	Hobbit Left Sling Axe Decal, Front (-01)	1
	62-0011-04	Hobbit Right Sling Axe Decal, Front (-02)	1
14	62-0011-07	Hobbit Left Sling Axe Decal, Back (-01)	1
	62-0011-03	Hobbit Right Sling Axe Decal, Back (-02)	1

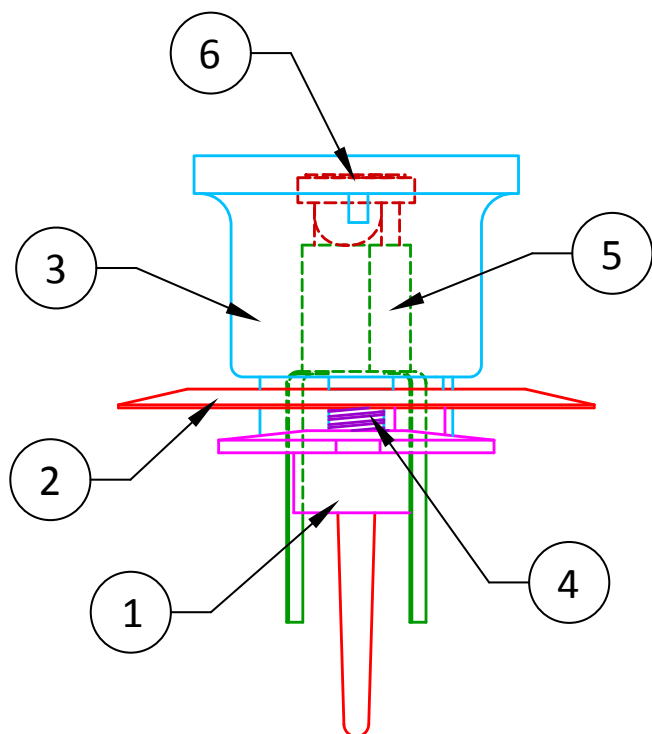


Pop Bumper Bottom Assembly
51-0004-01

Item	Part Number	Description	Qty
1	10-0021-00	Pop Bumper Yoke, Steel	1
2	10-0021-01	Pop Bumper Yoke, Bakelite	1
3	10-5003-00	Pop Bumper Coil Brkt	1
4	10-7003-00	Pop Bumper Coil Centering Brkt	1
5	11-0004-00	Pop Bumper Plunger	1
6	13-7002-00	Pop Bumper Plunger Return Spring	1
7	18-7007-00	Pop Bumper Leaf Switch Assy	1
a)	110-0002-0T	Diode, 1N4004, 400V, 1A	1
b)	10-0022-00	Pop Bumper Switch Brkt	1
c)	10-0022-01	Curved Switch Plate	1
d)	18-0002-00	Pop Bumper Leaf Switch	1
e)	30-0002-00	Pop Bumper Switch Spoon	1
f)	80-0005-12	5-40 x 3/4" PPH MS	2
g)	91-2005-00	5-40 Hex Nut	2
8	23-0010-00	26-1200 Standard Coil	1
9	30-0014-28	1-3/4" Coil Tubing, Straight	1
10	80-2006-04	6-32 x 1/4" HWH Phillips MS, Serrated	2



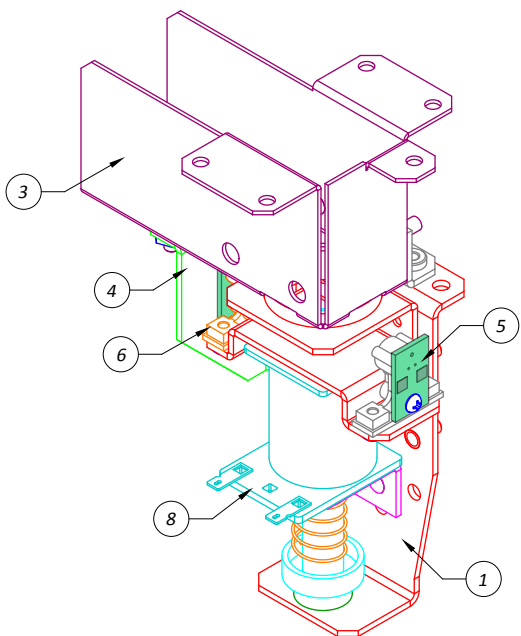
Pop Bumper Top Assembly, White 51-0006-09



Item	Part Number	Description	Qty
1	30-0003-09	Pop Bumper Base, White	1
2	30-0004-09	Pop Bumper Skirt, White	1
3	30-0005-09	Pop Bumper Body, White	1
4	13-7003-00	Pop Bumper Skirt Spring	1
5*	30-0046-00	555 Light Socket, With Leads	1
6*	24-0006-13	Wedge Base LED, 12V, 4-Chip, Cool White	1

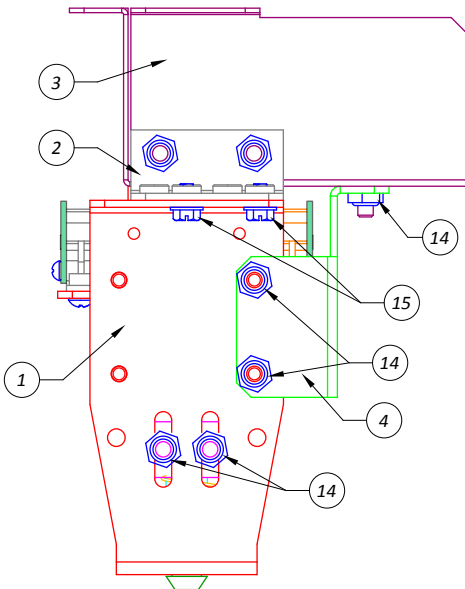
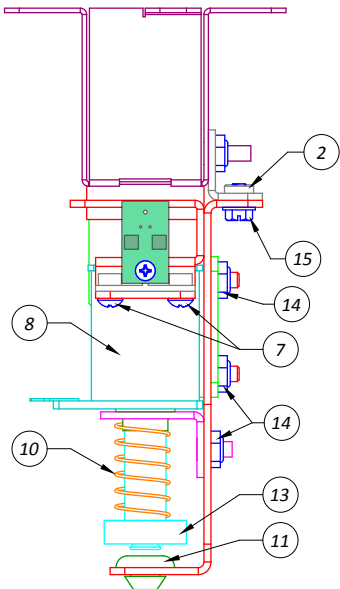
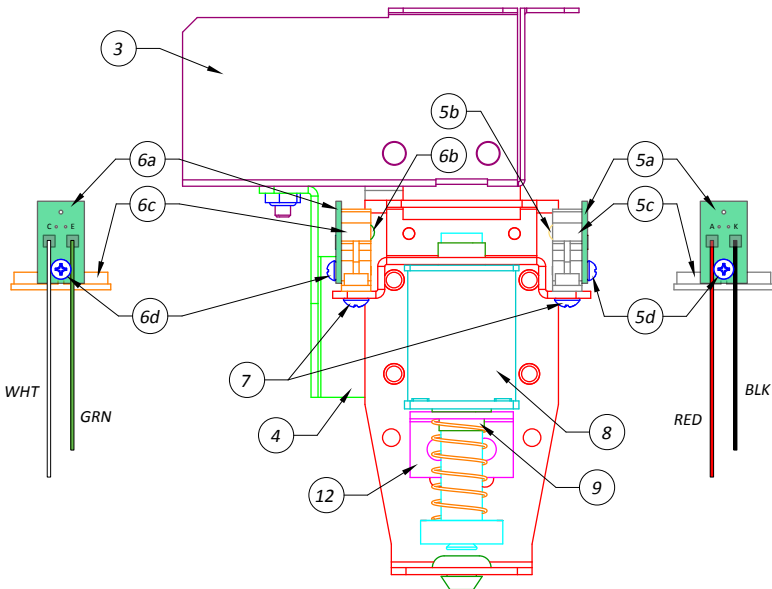
* Used in Left Pop Bumper of Hobbit LE & SE games only.

VUK/Steel Trough Assembly, Right Mount
51-0012-00

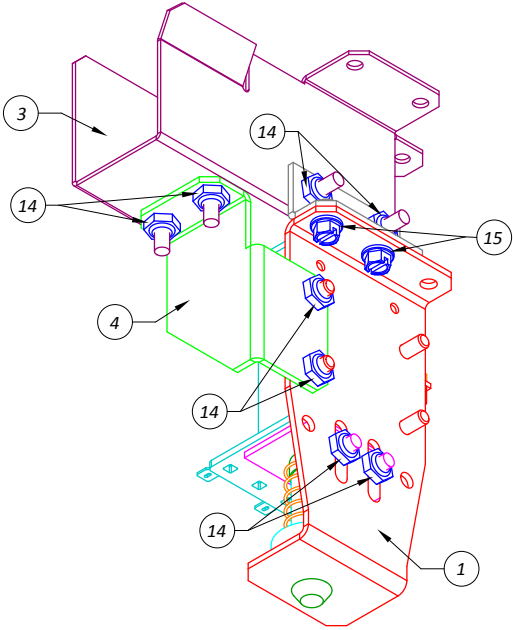


Item	Part Number	Description	Qty
1	10-5005-01	Trough Mount VUK Coil Brkt	1
2	10-0145-02	Trough Mount VUK Brkt, Center	1
3	10-9004-00	VUK Steel Entry Trough, Right	1
4	10-0145-01	Trough Mount VUK Brkt, Right	1
5	15-5004-01	VUK Opto PCB Assy, Transmitter	1
a)	15-0005-00	VUK Infrared LED Bd	1
b)	24-0002-0T	LED, IR Emitting, QED123, 880nm, 5mm	1
c)	30-0039-00	Opto Base, White	1
d)	82-0004-06	#4 x 3/8" PPH SMS	1
6	15-5004-00	VUK Opto PCB Assy, Receiver	1
a)	15-0005-01	VUK Phototransistor Bd	1
b)	24-0003-0T	Phototransistor, IR, QSD123, 880nm, 5mm	1
c)	30-0038-00	Opto Base, Black	1
d)	82-0004-06	#4 x 3/8" PPH SMS	1

Item	Part Number	Description	Qty
7	83-0006-06	6-32 x 3/8" PPH MS, Type 25 Thread Cutter	4
8	23-0003-00	23-800 Standard Coil	1
9	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
10	13-7005-00	VUK Plunger Return Spring	1
11	25-9001-00	Rubber Bumper Plug, Black	1
12	10-7004-00	Coil Centering Brkt, 5/8", 1/2" Mnts, 8-32 Studs	1
13	11-5001-00	VUK Armature Plunger Assy	1
14	91-0008-00	8-32 Nylon Stop Nut	8
15	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	2

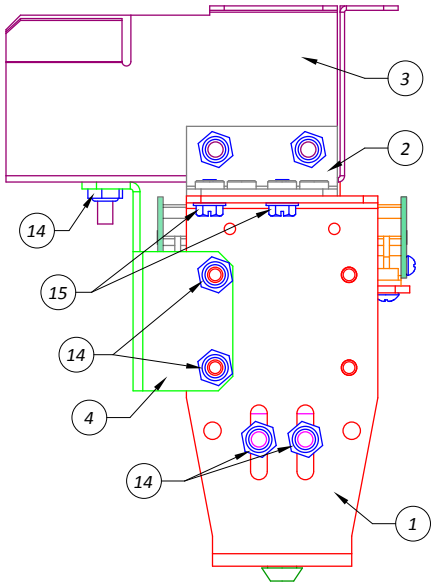
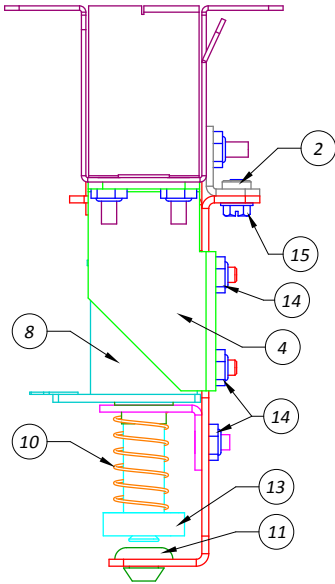
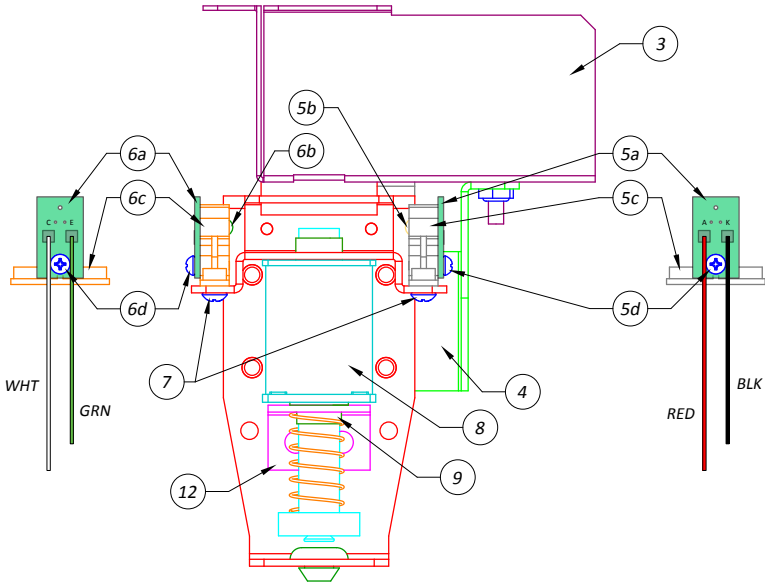


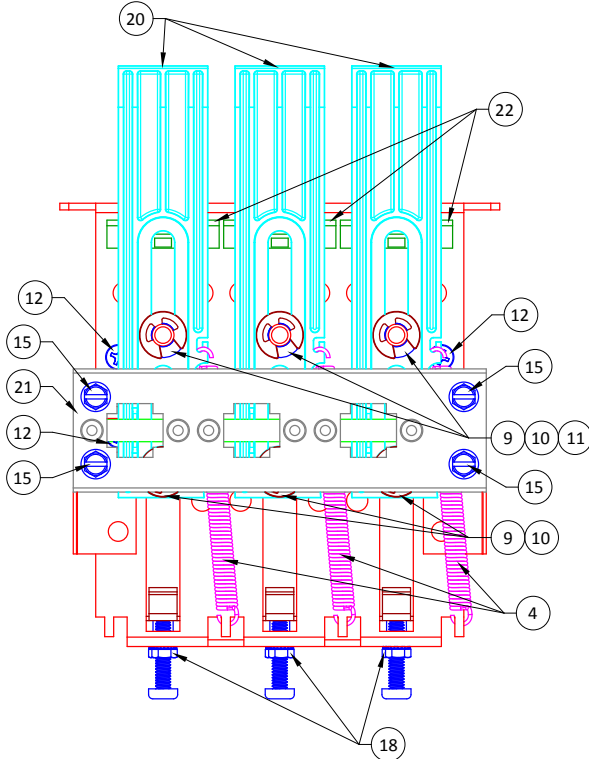
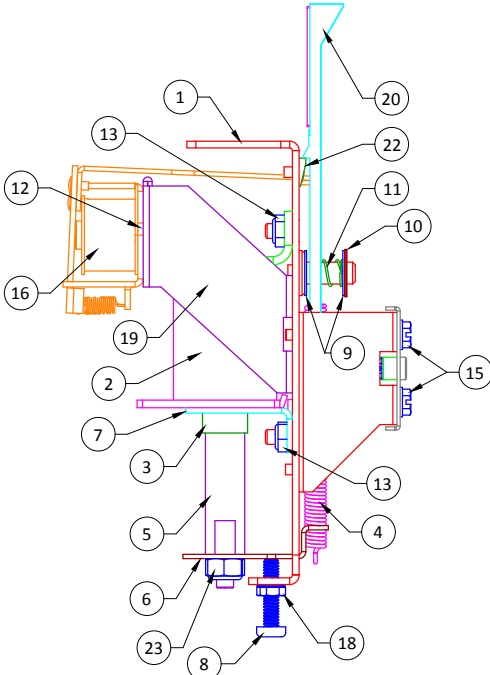
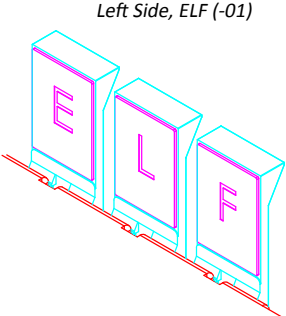
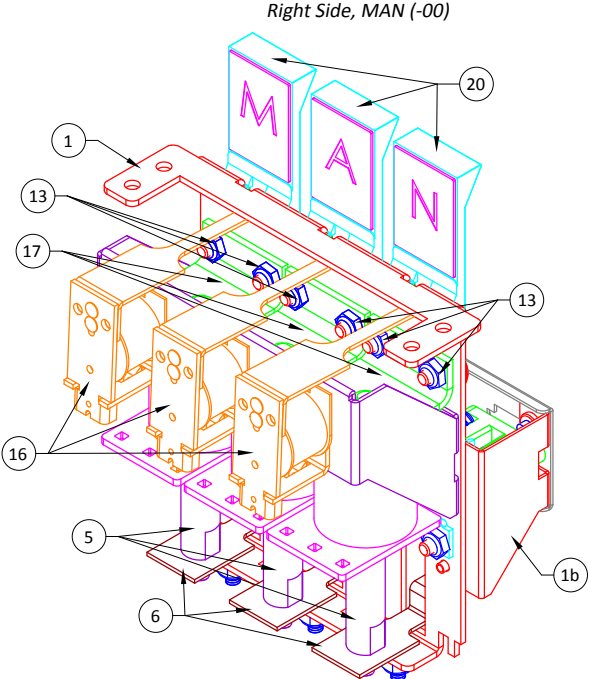
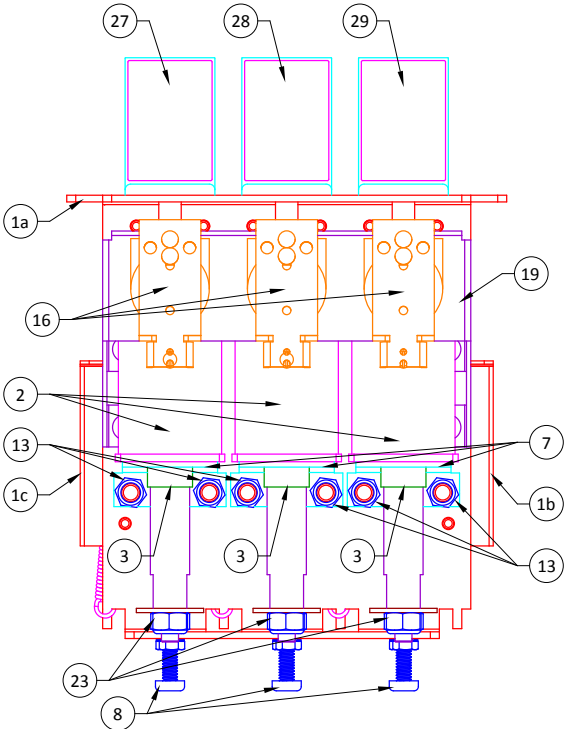
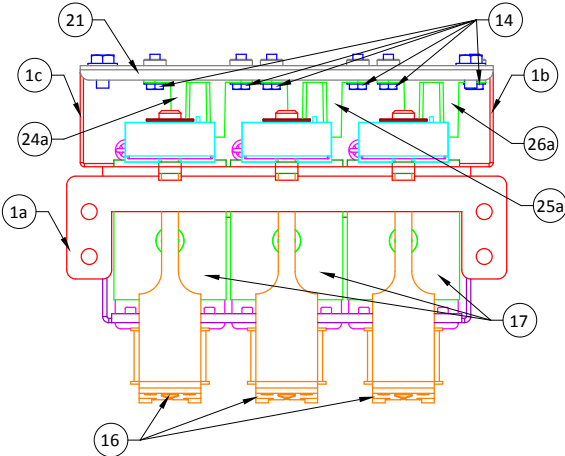
VUK/Steel Trough Assembly, Left Mount
51-0012-01



Item	Part Number	Description	Qty
1	10-5005-01	Trough Mount VUK Coil Brkt	1
2	10-0145-02	Trough Mount VUK Brkt, Center	1
3	10-9004-01	VUK Steel Entry Trough, Left	1
4	10-0145-00	Trough Mount VUK Brkt, Left	1
5	15-5004-01	VUK Opto PCB Assy, Transmitter	1
a)	15-0005-00	VUK Infrared LED Bd	1
b)	24-0002-0T	LED, IR Emitting, QED123, 880nm, 5mm	1
c)	30-0039-00	Opto Base, White	1
d)	82-0004-06	#4 x 3/8" PPH SMS	1
6	15-5004-00	VUK Opto PCB Assy, Receiver	1
a)	15-0005-01	VUK Phototransistor Bd	1
b)	24-0003-0T	Phototransistor, IR, QSD123, 880nm, 5mm	1
c)	30-0038-00	Opto Base, Black	1
d)	82-0004-06	#4 x 3/8" PPH SMS	1

Item	Part Number	Description	Qty
7	83-0006-06	6-32 x 3/8" PPH MS, Type 25 Thread Cutter	4
8	23-0003-00	23-800 Standard Coil	1
9	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
10	13-7005-00	VUK Plunger Return Spring	1
11	25-9001-00	Rubber Bumper Plug, Black	1
12	10-7004-00	Coil Centering Brkt, 5/8", 1/2" Mnts, 8-32 Studs	1
13	11-5001-00	VUK Armature Plunger Assy	1
14	91-0008-00	8-32 Nylon Stop Nut	8
15	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	2



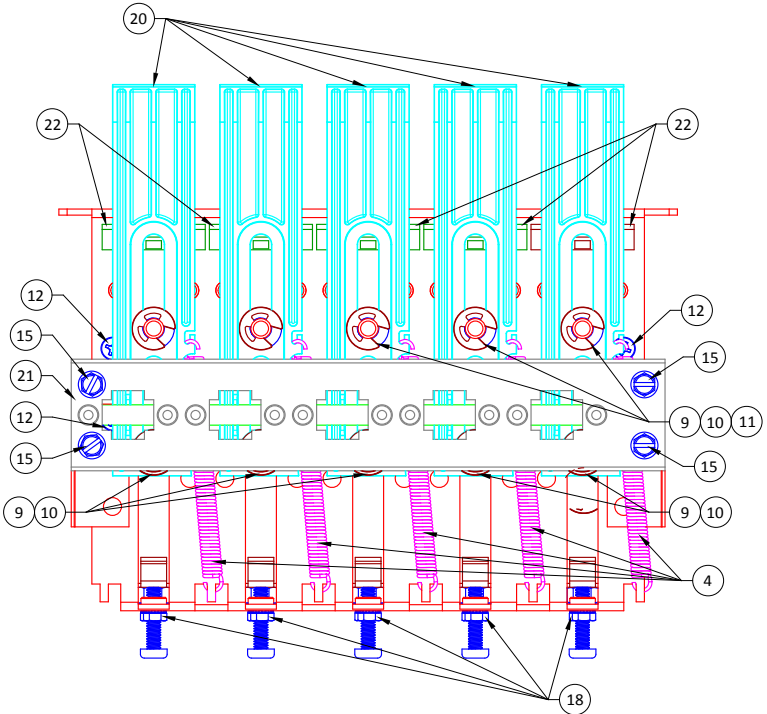
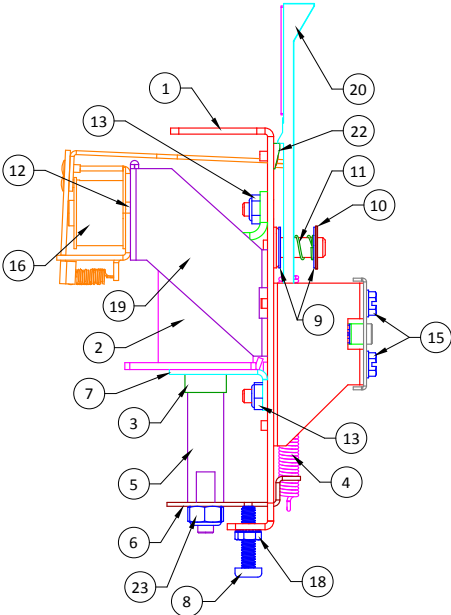
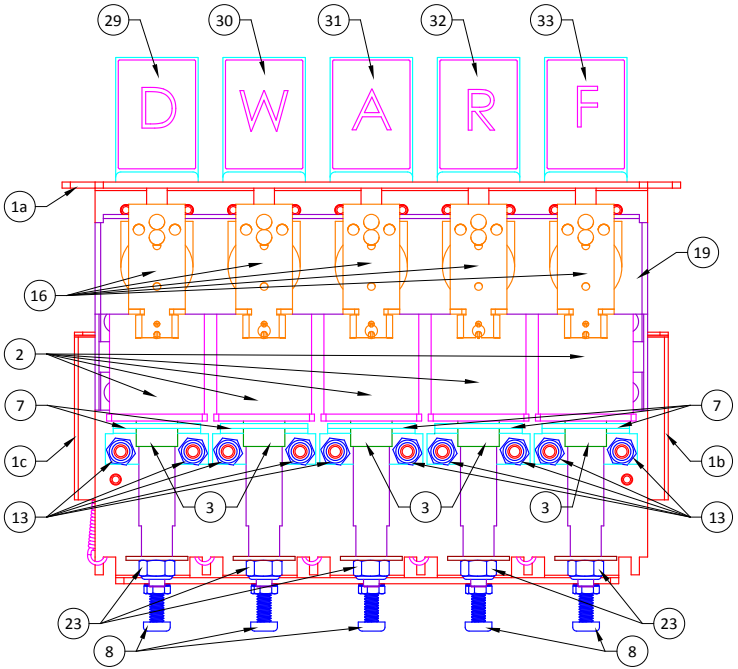
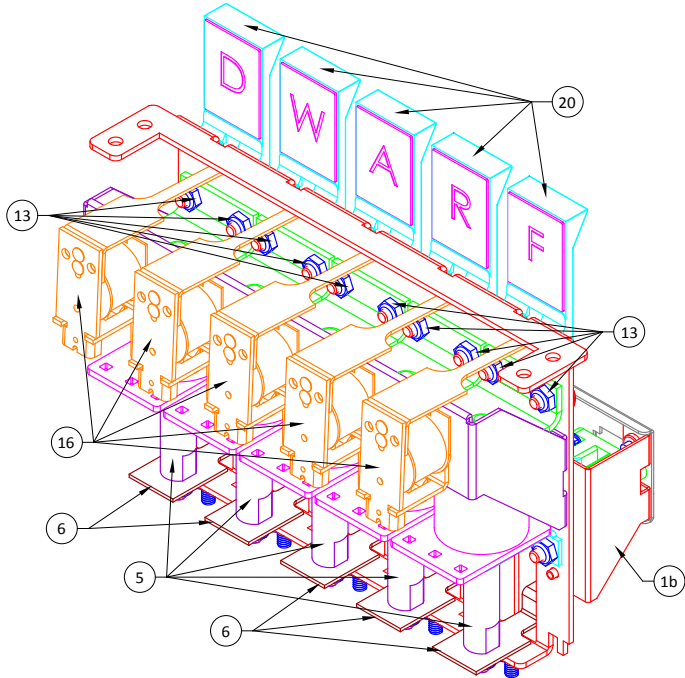
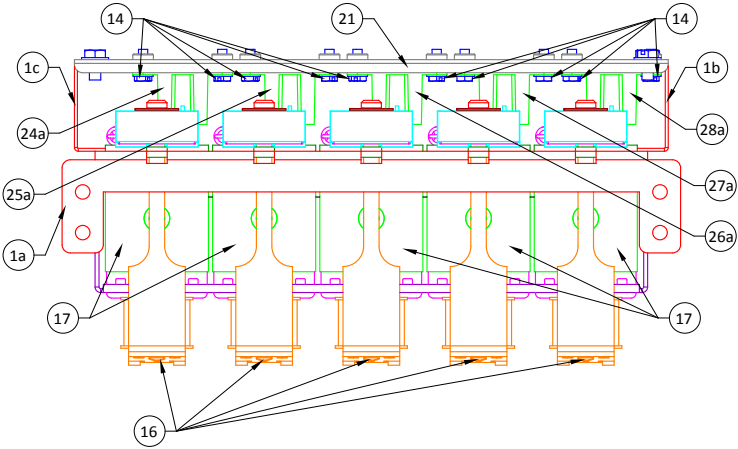


3-Bank Drop Target Assemblies, Right & Left

51-0015-00, 51-0015-01

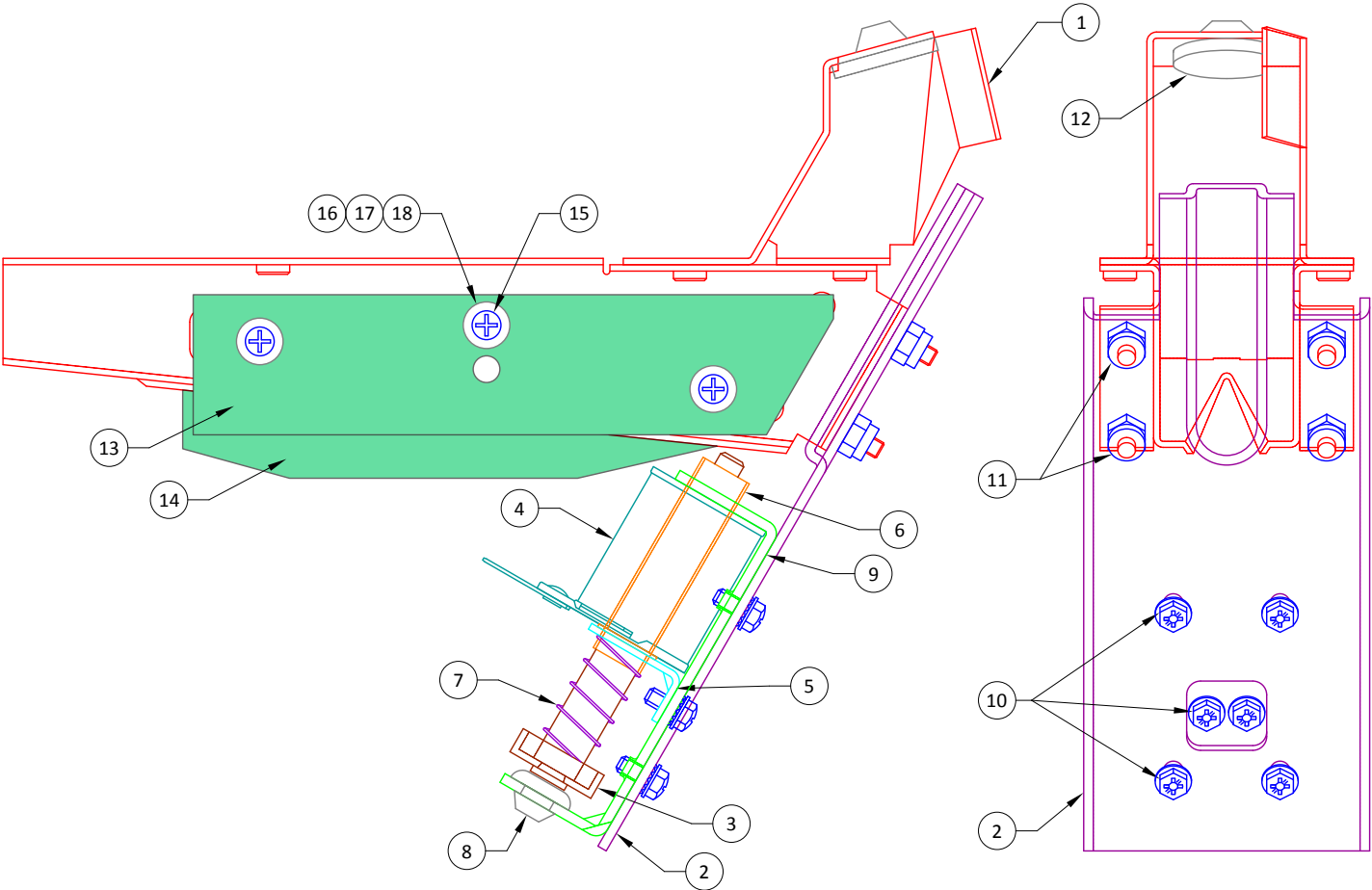
Item	Part Number	Description	Qty
1	10-8002-03	3-Bank Drop Tgt Main Brkt Assy	1
a)	10-5028-03	3-Bank Drop Tgt Reset Coil Brkt	1
b)	10-0141-00	Drop Tgt Right Opto Brkt Mount	1
c)	10-0141-01	Drop Tgt Left Opto Brkt Mount	1
2	23-0010-00	26-1200 Standard Coil	3
3	30-0014-30	1-7/8" Coil Tubing, Straight	3
4	13-7018-00	Drop Tgt Extension Spring, Large	3
5	11-0038-00	Drop Tgt Coil Plunger, 2.08"	3
6	10-0063-01	Drop Tgt Reset Brkt	3
7	10-7009-00	Coil Centering Brkt, 3/4"	3
8	80-0408-12	8-32 x 3/4" PPH MS, Nylon	3
9	92-0008-01	Flat Washer, 0.256" x 0.5" x 0.032"	9
10	94-4001-04	1/4" Shaft E-Clip	6
11	13-7008-00	Drop Tgt Compression Spring	3
12	80-6006-04	6-32 x 1/4" PFH MS, w/ Undercut	7
13	91-0008-00	8-32 Nylon Stop Nut	15
14	80-2104-06	4-40 x 3/8" HWH MS, Black	6
15	80-2006-04	6-32 x 1/4" HWH Phillips MS, Serrated	4
16	51-5037-00	Drop Tgt Retract Coil Assy	3
17	10-7008-00	Drop Tgt Coil Stop Brkt	3
18	91-1008-00	8-32 Keps Nut	3
19	10-0144-03	3-Bank Drop Tgt Retract Coil Mtg Brkt	1

Item	Part Number	Description	Qty
20	30-0016-02	Drop Tgt, Rollover, Red	3
21	10-0143-03	3-Bank Drop Tgt Opto Mtg Brkt	1
22	30-0024-00	Drop Tgt Plastic Tgt Stop	3
23	91-0010-00	10-32 Nylon Stop Nut	3
24	18-7022-18-05	U-Shaped Opto Assy, OPB816Z, 18" Cable, GRN (-00)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
	18-7022-12-00	U-Shaped Opto Assy, OPB816Z, 12" Cable, BLK (-01)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
25	18-7022-17-06	U-Shaped Opto Assy, OPB816Z, 17" Cable, BLU (-00)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
	18-7022-11-01	U-Shaped Opto Assy, OPB816Z, 11" Cable, BRN (-01)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
26	18-7022-16-07	U-Shaped Opto Assy, OPB816Z, 16" Cable, VIO (-00)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
	18-7022-09-02	U-Shaped Opto Assy, OPB816Z, 9" Cable, RED (-01)	1
a)	18-5000-00	U-Shaped Opto, OPB816Z	1
27	62-0011-23	MAN Drop Tgt Decal (-00)	1
	62-0011-15	ELF Drop Tgt Decal (-01)	1
28	62-0011-24	MAN Drop Tgt Decal (-00)	1
	62-0011-16	ELF Drop Tgt Decal (-01)	1
29	62-0011-25	MAN Drop Tgt Decal (-00)	1
	62-0011-17	ELF Drop Tgt Decal (-01)	1



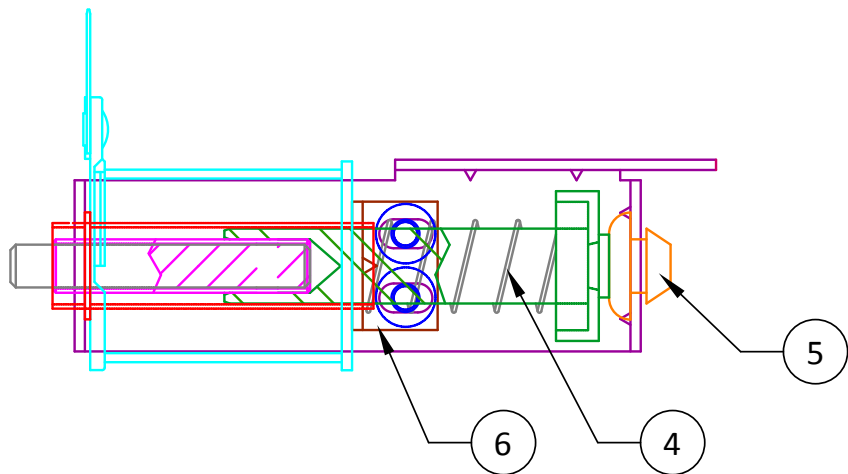
5-Bank Drop Target Assembly 51-0017-00

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	10-8002-05	5-Bank Drop Tgt Main Brkt Assy	1	19	10-0144-05	5-Bank Drop Tgt Retract Coil Mtg Brkt	1
a)	10-5028-05	5-Bank Drop Tgt Reset Coil Brkt	1	20	30-0016-02	Drop Tgt, Rollover, Red	5
b)	10-0141-00	Drop Tgt Right Opto Brkt Mount	1	21	10-0143-05	5-Bank Drop Tgt Opto Mtg Brkt	1
c)	10-0141-01	Drop Tgt Left Opto Brkt Mount	1	22	30-0024-00	Drop Tgt Plastic Tgt Stop	5
2	23-0010-00	26-1200 Standard Coil	5	23	91-0010-00	10-32 Nylon Stop Nut	5
3	30-0014-30	1-7/8" Coil Tubing, Straight	5	24	18-7022-17-00	U-Shaped Opto Assy, OPB816Z, 17" Cable, BLK	1
4	13-7018-00	Drop Tgt Extension Spring, Large	5	a)	18-5000-00	U-Shaped Opto, OPB816Z	1
5	11-0038-00	Drop Tgt Coil Plunger, 2.08"	5	25	18-7022-15-01	U-Shaped Opto Assy, OPB816Z, 15" Cable, BRN	1
6	10-0063-01	Drop Tgt Reset Brkt	5	a)	18-5000-00	U-Shaped Opto, OPB816Z	1
7	10-7009-00	Coil Centering Brkt, 3/4"	5	26	18-7022-13-02	U-Shaped Opto Assy, OPB816Z, 13" Cable, RED	1
8	80-0408-12	8-32 x 3/4" PPH MS, Nylon	5	a)	18-5000-00	U-Shaped Opto, OPB816Z	1
9	92-0008-01	Flat Washer, 0.256" x 0.5" x 0.032"	15	27	18-7022-12-03	U-Shaped Opto Assy, OPB816Z, 12" Cable, ORN	1
10	94-4001-04	1/4" Shaft E-Clip	10	a)	18-5000-00	U-Shaped Opto, OPB816Z	1
11	13-7008-00	Drop Tgt Compression Spring	5	28	18-7022-11-04	U-Shaped Opto Assy, OPB816Z, 11" Cable, YEL	1
12	80-6006-04	6-32 x 1/4" PFH MS, w/ Undercut	9	a)	18-5000-00	U-Shaped Opto, OPB816Z	1
13	91-0008-00	8-32 Nylon Stop Nut	20	29	62-0011-18	Hobbit DWARF Drop Tgt Decal	1
14	80-2104-06	4-40 x 3/8" HWH MS, Black	10	30	62-0011-19	Hobbit DWARF Drop Tgt Decal	1
15	80-2006-04	6-32 x 1/4" HWH Phillips MS, Serrated	4	31	62-0011-20	Hobbit DWARF Drop Tgt Decal	1
16	51-5037-00	Drop Tgt Retract Coil Assy	5	32	62-0011-21	Hobbit DWARF Drop Tgt Decal	1
17	10-7008-00	Drop Tgt Coil Stop Brkt	5	33	62-0011-22	Hobbit DWARF Drop Tgt Decal	1
18	91-1008-00	8-32 Keps Nut	5				



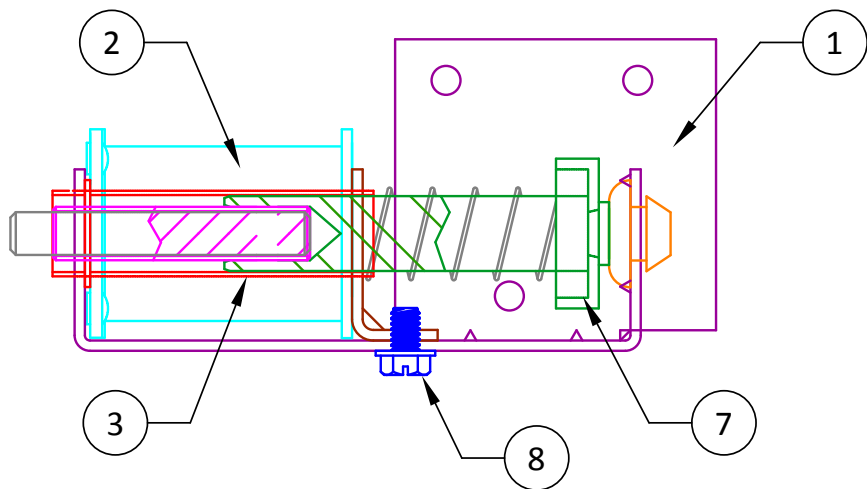
5-Ball Trough Assembly
51-0021-00

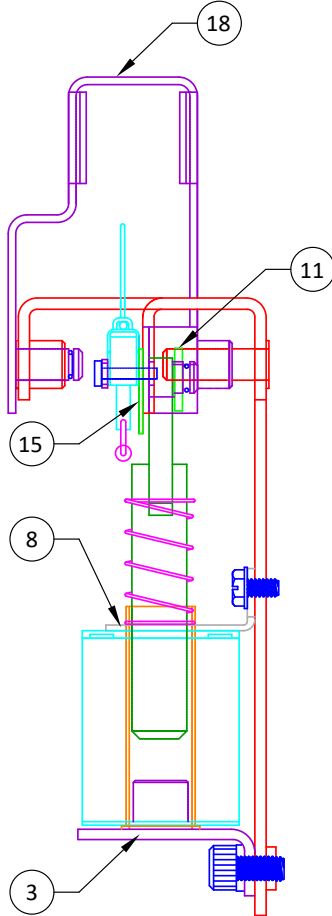
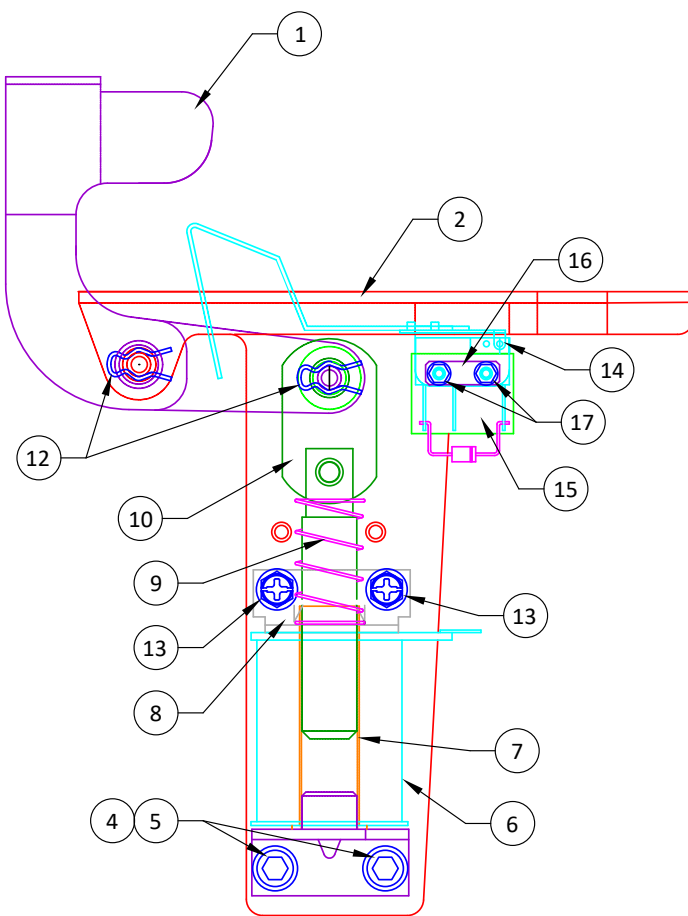
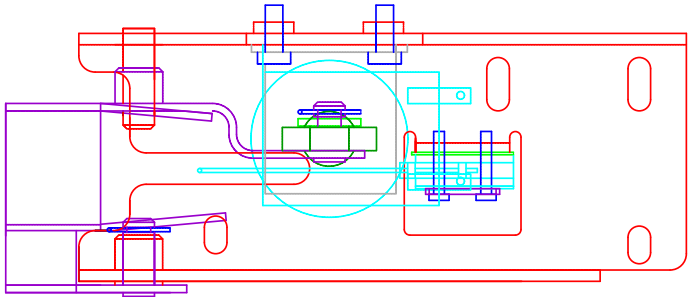
Item	Part Number	Description	Qty
1	10-5010-00	Ball Trough Main Brkt	1
2	10-5010-01	Ball Trough Coil Brkt	1
3	11-5001-00	VUK Armature Plunger Assy	1
4	23-0010-00	26-1200 Standard Coil	1
5	10-7000-00	Coil Centering Brkt, 5/8", 3/8" Mnts, 8-32 Tapped	1
6	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
7	13-7005-00	VUK Plunger Return Spring	1
8	25-9001-00	Rubber Bumper Plug, Black	1
9	10-7006-00	Ball Trough Coil Mtg Brkt	1
10	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	6
11	91-0008-00	8-32 Nylon Stop Nut	4
12	25-9001-01	Ball Trough Bumper Plug, Blue	1
13	15-0004-01	5-Ball Trough Opto Transmitter Bd Assy	1
14	15-0004-00	5-Ball Trough Opto Receiver Bd Assy	1
15	80-2006-10	6-32 x 5/8" HWH Phillips MS, Serrated	6
16	25-9006-00	Rubber Grommet, Ball Trough PCB Mtg	6
17	92-0006-00	#6 Flat Washer, 0.141" ID, 0.437" OD	6
18	94-3002-00	Ball Trough PCB Metal Bushing	6



Kickback Assembly, Left Mount 51-0025-00

Item	Part Number	Description	Qty
1	10-5007-00	Kickback/Knocker Coil Brkt, Left Mount	1
2	23-0003-00	23-800 Standard Coil	1
3	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
4	13-7005-00	VUK Plunger Return Spring	1
5	25-9001-00	Rubber Bumper Plug, Black	1
6	10-7000-00	Coil Centering Brkt, 5/8", 3/8" Mnts, 8-32 Tapped	1
7	11-5012-00	Kickback Plunger Assy	1
8	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	2





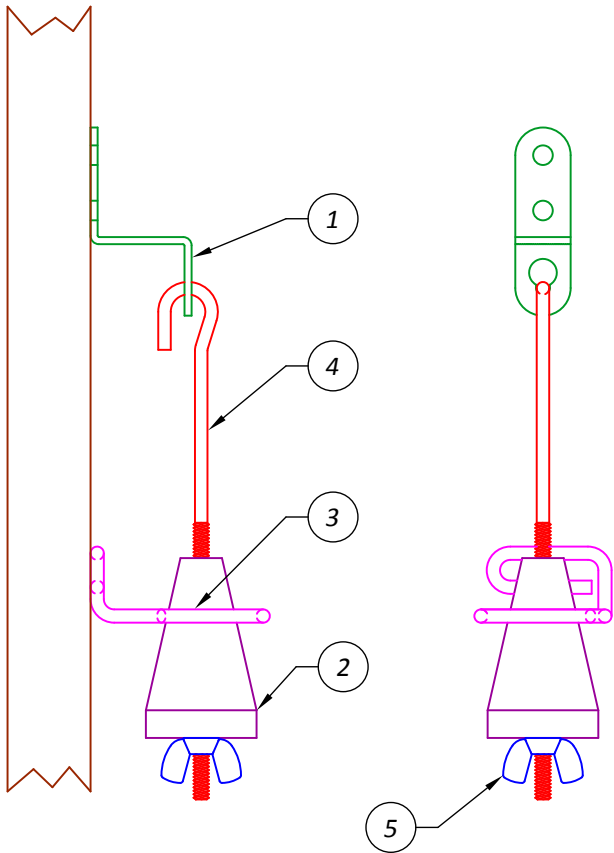
Auto-Launch Assembly

51-000026-00

Item	Part Number	Description	Qty
1	10-0028-00	Auto-Launch Crank Brkt	1
2	10-5009-00	Auto-Launch Coil Brkt	1
3	10-7005-00	Auto-Launch Coil Stop Brkt	1
4	90-4010-06	10-32 x 3/8" SH CS, Black	2
5	92-1010-00	#10 Split Lock Washer	2
6	23-0003-00	23-800 Standard Coil	1
7	30-0014-28	1-3/4" Coil Tubing, Straight	1
8	10-7009-00	Coil Centering Brkt, 3/4"	1
9	13-7004-00	Slingshot Plunger Return Spring	1
10	11-5000-00	Flipper Coil Plunger & Link Assy	1
11	95-2651-20-67	Flat Washer, 0.265" ID, 0.5" OD, 0.067" TH	1
12	13-9002-00	Hairpin Clip	2
13	80-2006-04	6-32 x 1/4" HWH Phillips, Serrated	2
14	18-3001-00	Auto-Launch Microswitch & Wireform	1
15	70-9002-00	Microswitch Insulator, Fish Paper	1
16	10-0024-01	Microswitch Protector Plate, #2	1
17	80-2102-08	2-56 x 1/2" HWH MS, Black	2
18	62-0002-00	Auto-Launch Crank Decal	1

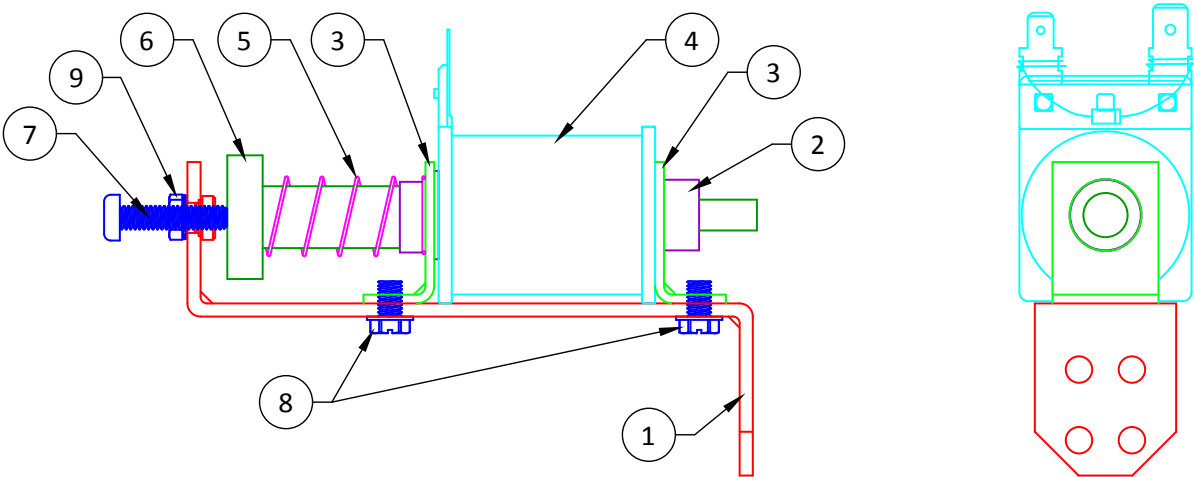
Plumb Bob Tilt Assembly 51-0028-00

Item	Part Number	Description	Qty
1	10-0086-00	Tilt Hanger Wire Brkt	1
2	11-0028-00	Plumb Bob Weight	1
3	13-3008-00	Tilt Contact Wire Form Brkt	1
4	13-3009-00	Tilt Hanger Wire	1
5	91-3406-00	6-32 Wing Nut, Nylon	1



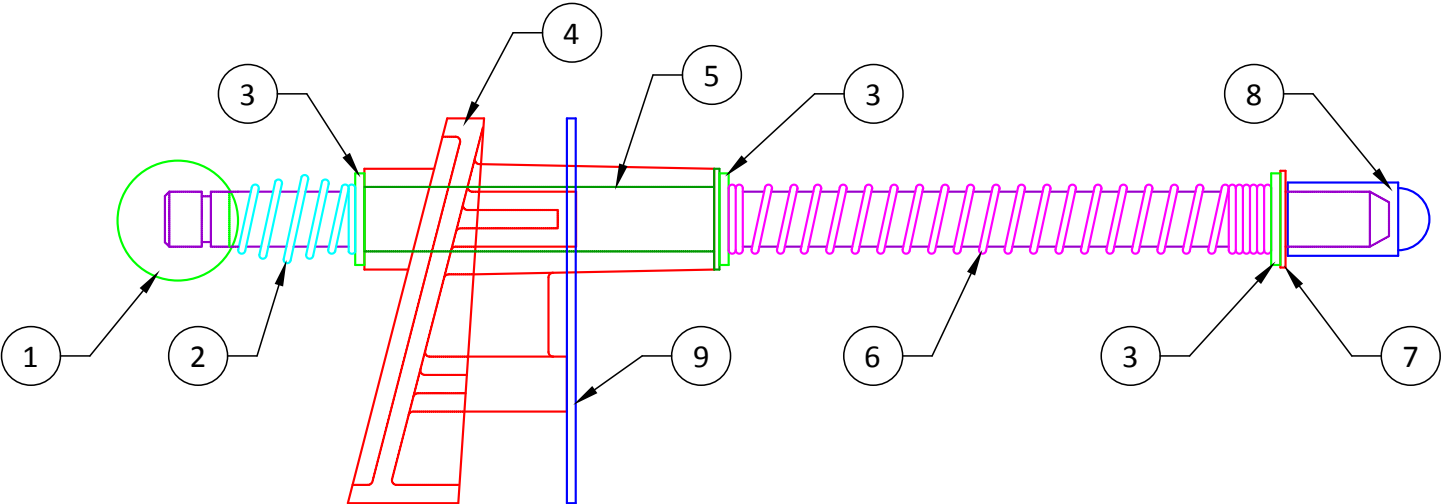
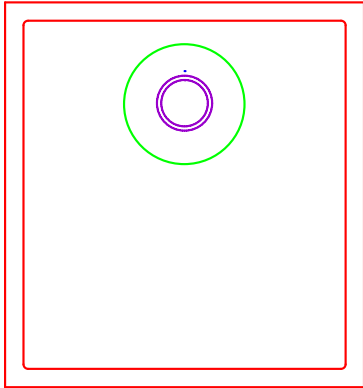
Disappearing Post Assembly 51-0030-00

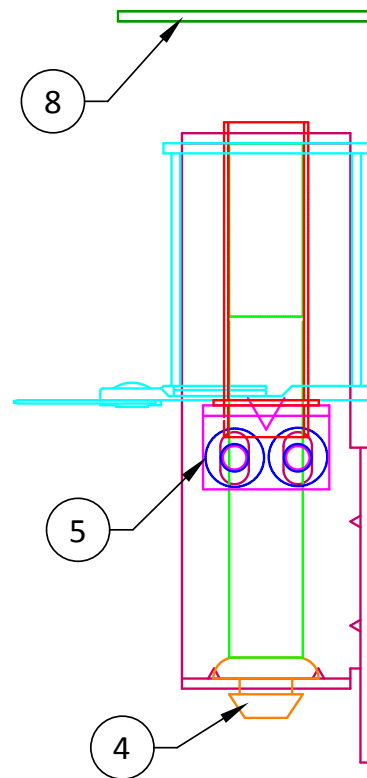
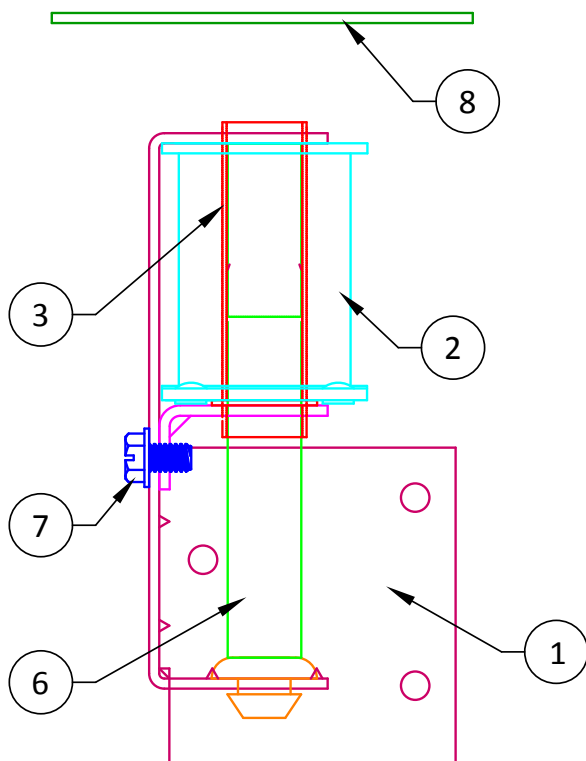
Item	Part Number	Description	Qty
1	10-5027-00	Disappearing Post Coil Brkt	1
2	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
3	10-7000-00	Coil Centering Brkt, 5/8", 3/8" Mnts, 8-32 Tapped	2
4	23-0010-00	26-1200 Standard Coil	1
5	13-7005-00	VUK Plunger Return Spring	1
6	11-5009-00	Disappearing Post Plunger Assy	1
7	80-0408-12	8-32 x 3/4" PPH MS, Nylon	1
8	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	4
9	91-1008-00	8-32 Keps Nut	1



Ball Shooter Assemblies
51-0031-01, 51-0031-02, 51-0031-03, 51-0031-04

Item	Part Number	Description	Qty
1	11-0007-00	Ball Shooter Rod, Black Ball	1
2	13-7006-00	Ball Shooter Outer Spring	1
3	95-2564-58-16	Flat Washer, 25/64" x 5/8" x 16ga	4
4 LE	14-0001-10	Ball Shooter Housing, Bronze Vein (-01)	1
SE	14-0001-09	Ball Shooter Housing, Gold Vein (-02)	1
BA	14-0001-11	Ball Shooter Housing, Black River (-04)	1
Std	14-0001-08	Ball Shooter Housing, Chrome (-03)	1
5	30-0021-00	Ball Shooter Sleeve	1
6	13-7007-02	Ball Shooter Power Spring, Brown	1
7	94-4001-06	3/8" Shaft E-Clip	1
8	25-9003-00	Ball Shooter Tip, Black	1
9	10-0025-00	Ball Shooter Cabinet Mtg Plate	1



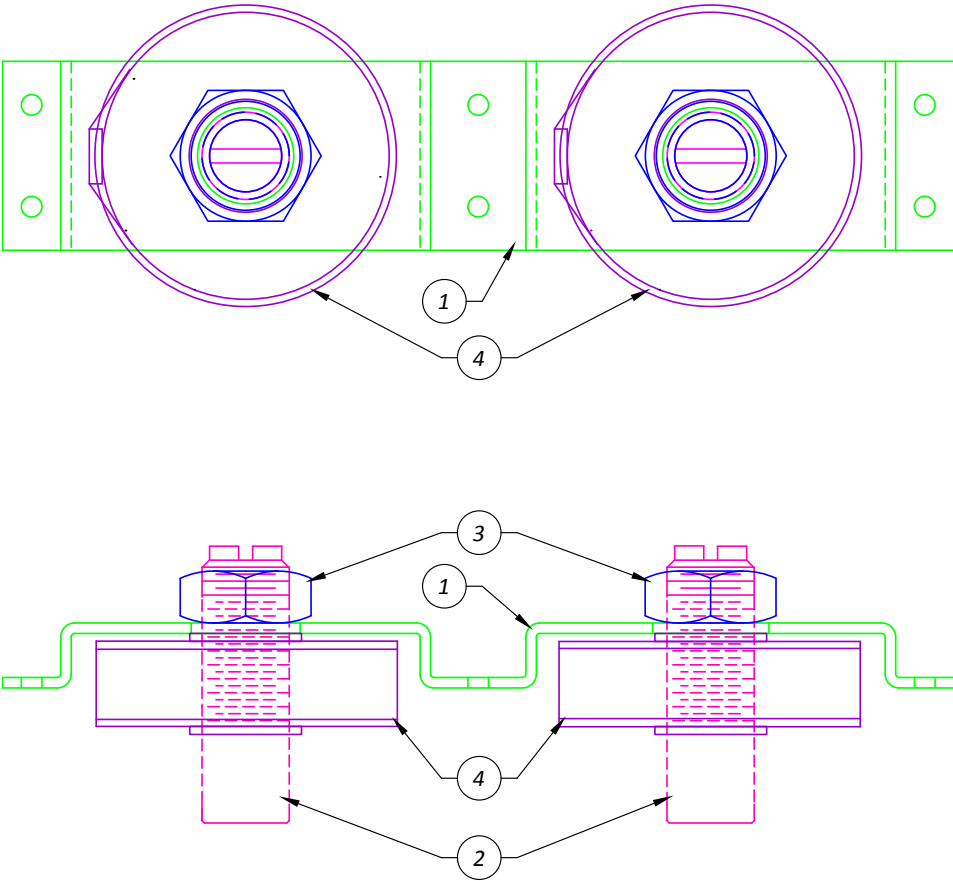


Kicker Assembly, Vertical 51-0032-01

Item	Part Number	Description	Qty
1	10-5007-00	Kickback/Kicker Coil Brkt, Left Mount	1
2	23-0003-00	23-800 Standard Coil	1
3	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
4	25-9001-00	Rubber Bumper Plug, Black	1
5	10-7000-00	Coil Centering Brkt, 5/8", 3/8" Mnts, 8-32 Tapped	1
6	11-0011-00	Kicker Plunger Assy	1
7	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	2
8	10-0016-00	Kicker Strike Plate	1

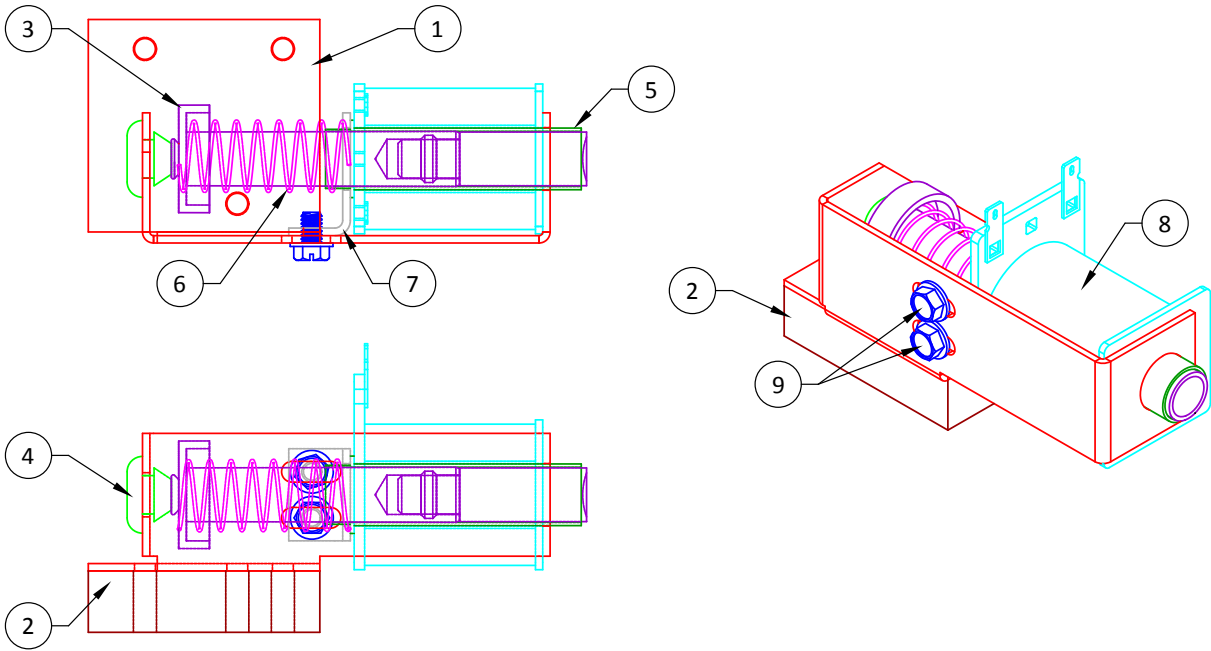
Dual Magnet Assembly
51-0046-00

Item	Part Number	Description	Qty
1	10-5025-00	Dual Magnet Brkt, Adjustable Core	1
2	11-0012-00	Magnet Pole Shaft	2
3	91-2034-00	3/4-16 Hex Jam Nut	2
4	23-4005-00	22-675 Lg Magnet Coil	2



Subway Diverter Assembly
51-0048-00

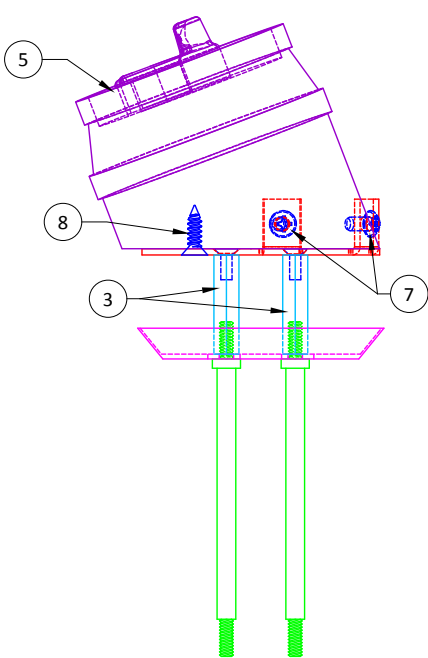
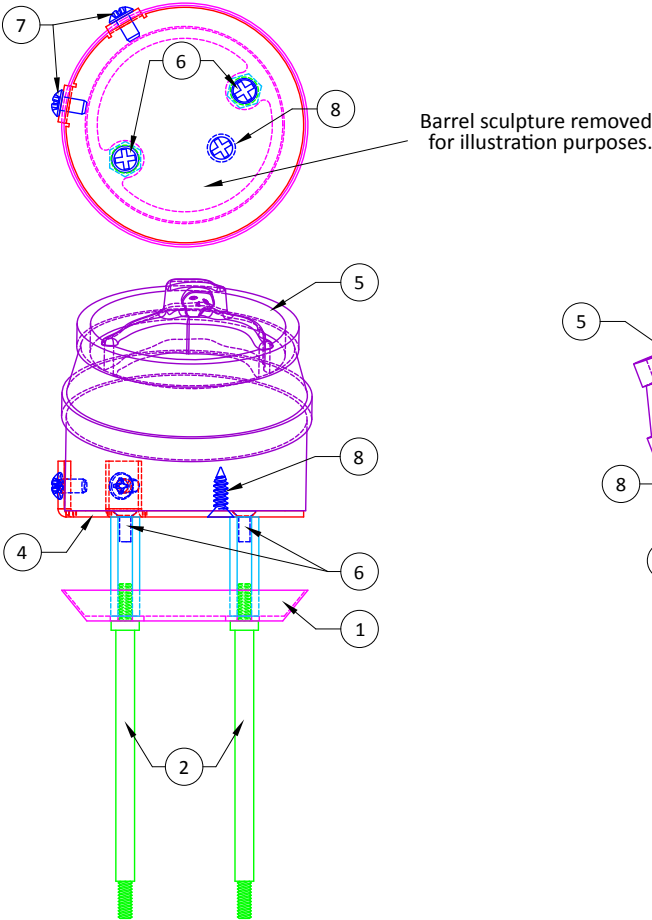
Item	Part Number	Description	Qty
1	10-5007-01	Kickback/Knocker Coil Brkt, Right Mount	1
2	05-3006-00	Kickback Wood Spacer	1
3	11-5009-01	Subway Diverter Plunger Assy	1
4	25-9001-00	Rubber Bumper Plug, Black	1
5	30-0014-30-1	1-7/8" Coil Tubing, Flanged	1
6	13-7005-00	VUK Plunger Return Spring	1
7	10-7000-00	Coil Centering Brkt, 5/8", 3/8" Mnts, 8-32 Tapped	1
8	23-0010-00	26-1200 Standard Coil	1
9	80-2008-04	8-32 x 1/4" HWH Phillips MS, Serrated	2



Upper Jump Bumper Barrel Assembly

51-0068-00

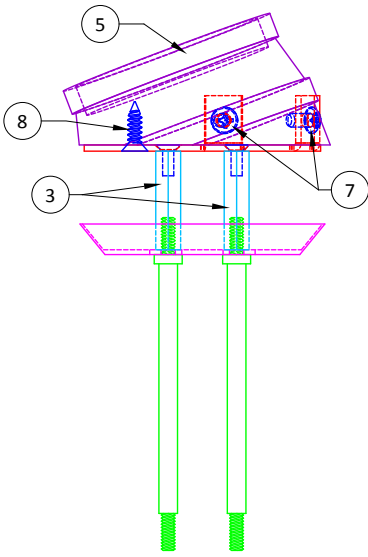
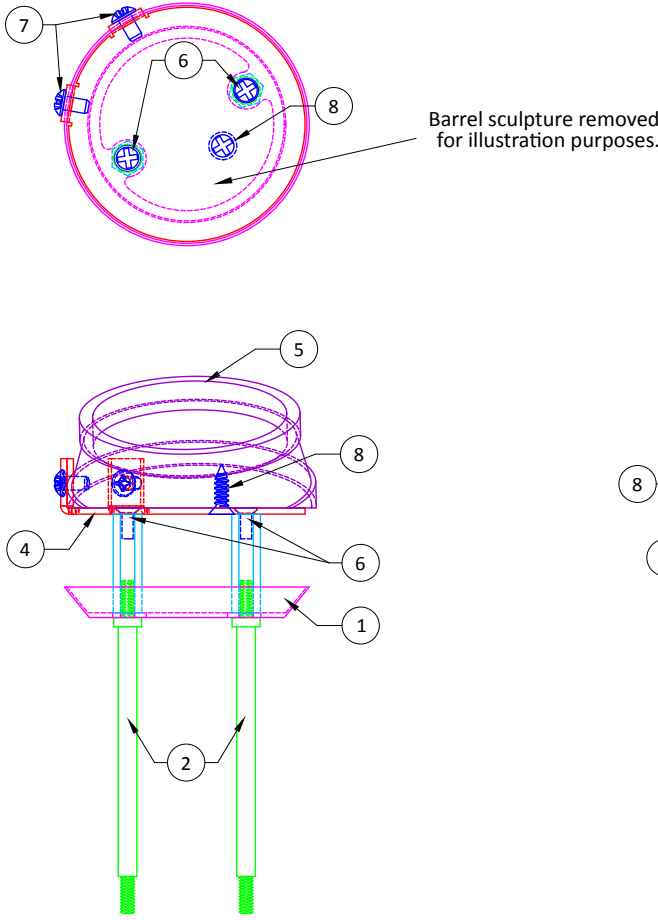
Item	Part Number	Description	Qty
1	11-0005-00	Pop Bumper Ring	1
2	11-0008-00	Pop Bumper Rod	2
3	94-1406-16	1/4" x 1" Hex Spacer, F-F, 6-32, Zinc	2
4	10-0035-01	Barrel Jump Bumper Mtg Plate	1
5	32-0025-00	Hobbit Dwarf In Barrel Sculpture	1
6	80-6106-06	6-32 x 3/8" PFH MS, w/Undercut, Black	2
7	82-0106-06	#6 x 3/8" PPH SMS, Black	2
8	82-6006-08	#6 x 1/2" PFH SMS, w/Undercut	1

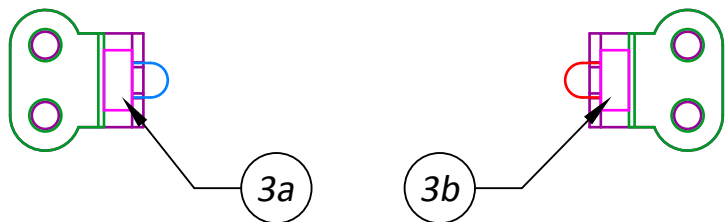


Right Jump Bumper Barrel Assembly

51-0069-00

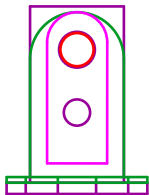
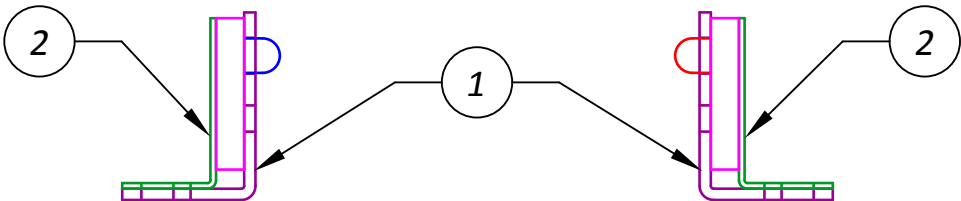
Item	Part Number	Description	Qty
1	11-0005-00	Pop Bumper Ring	1
2	11-0008-00	Pop Bumper Rod	2
3	94-1406-16	1/4" x 1" Hex Spacer, F-F, 6-32, Zinc	2
4	10-0035-01	Barrel Jump Bumper Mtg Plate	1
5	32-0026-00	Hobbit Barrel Sculpture	1
6	80-6106-06	6-32 x 3/8" PFH MS, w/Undercut, Black	2
7	82-0106-06	#6 x 3/8" PPH SMS, Black	2
8	82-6006-08	#6 x 1/2" PFH SMS, w/Undercut	1

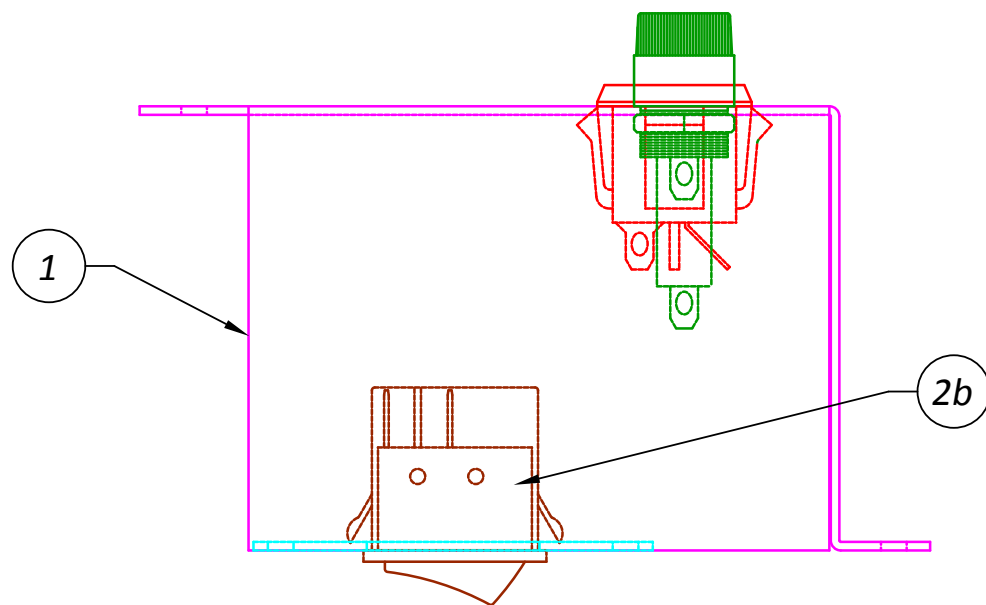
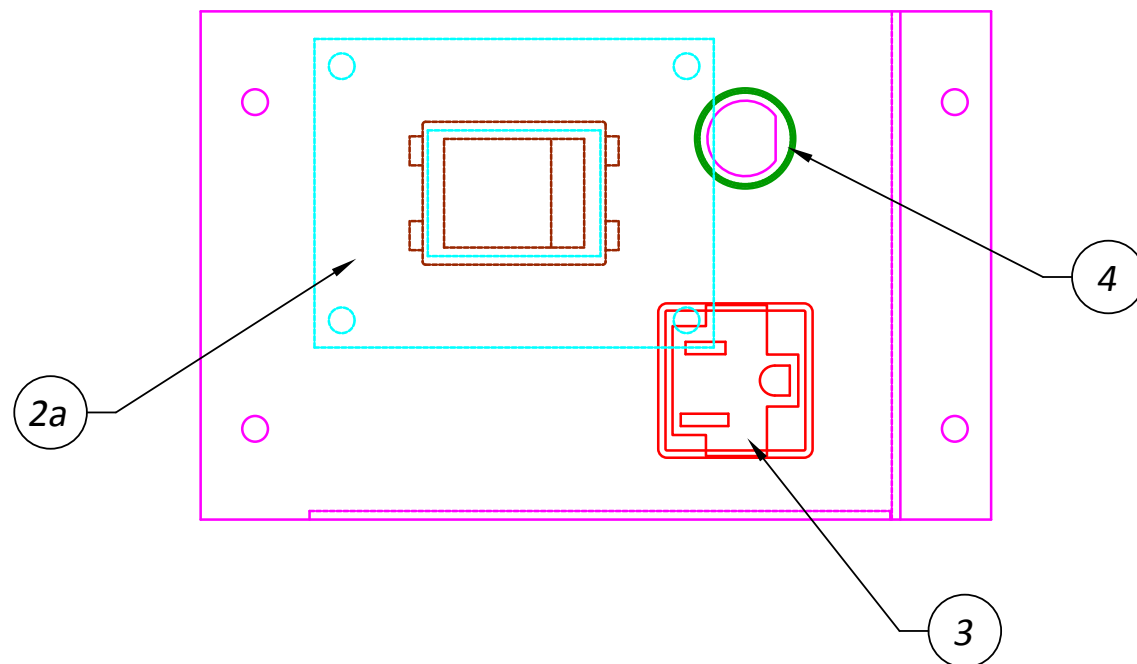




Playfield Opto Pair Assembly
51-0071-00

Item	Part Number	Description	Qty
1	10-0178-00	Single Opto Mtg Brkt	2
2	10-0097-00	Playfield Opto Retainer	2
3	18-7020-24-07	Opto Pair Assy, 24" Cable, VIO	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1

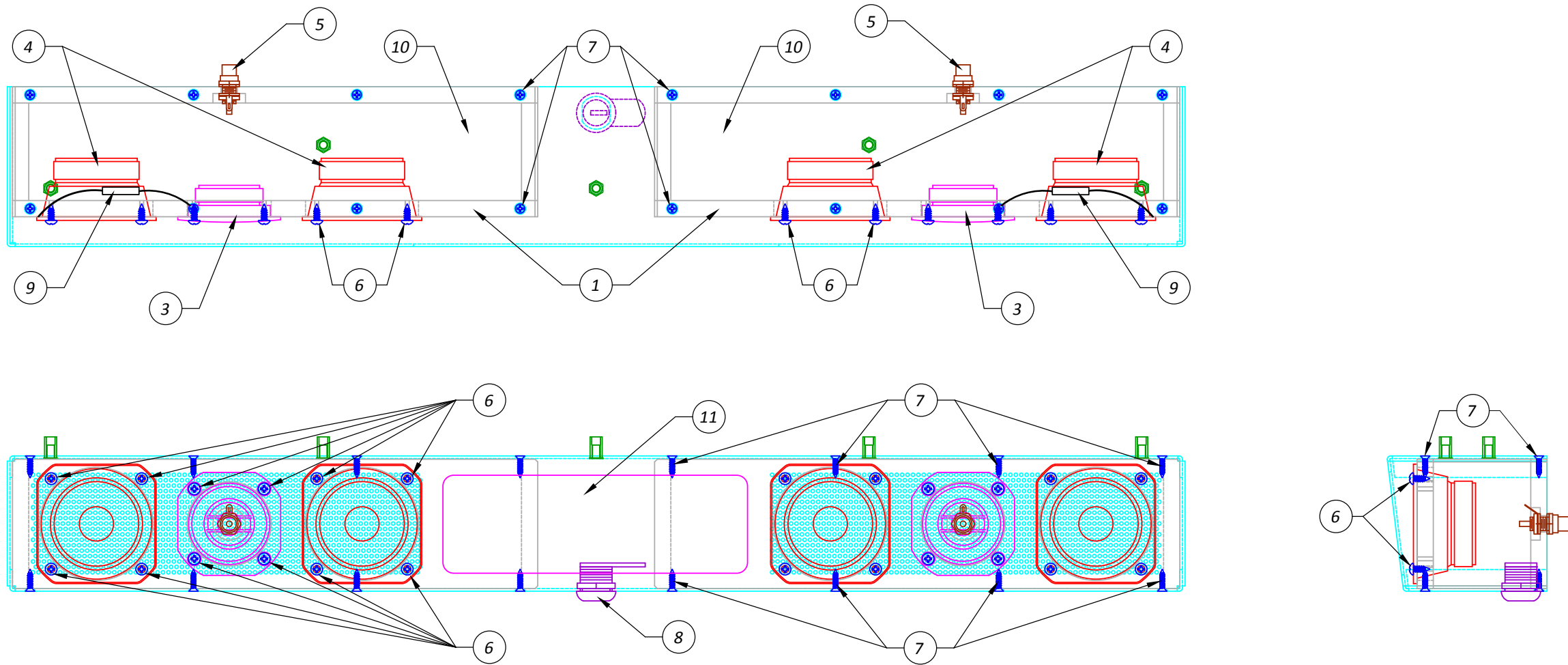




Power Box Assembly 51-5001-00

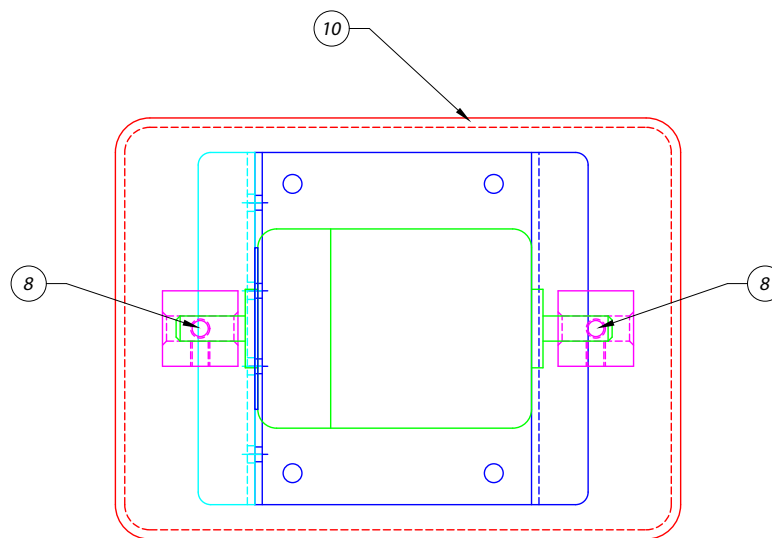
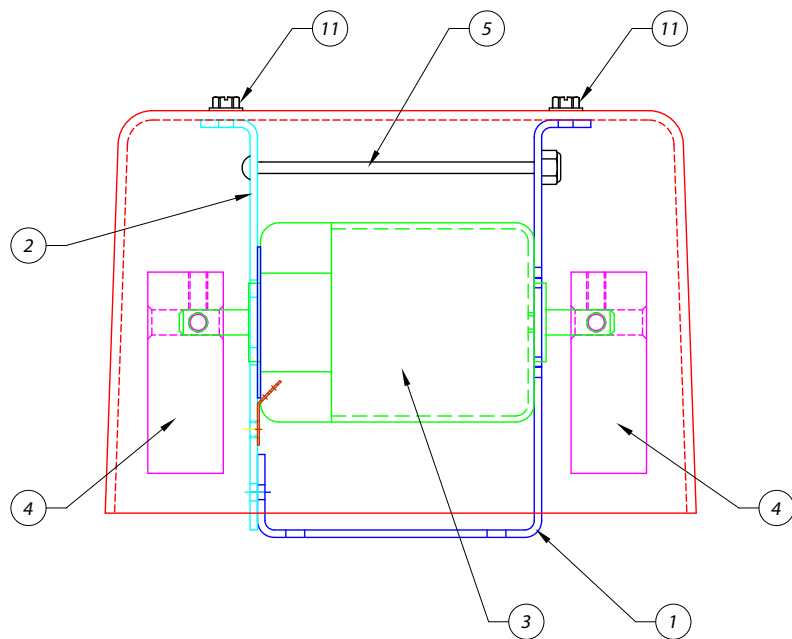
Item	Part Number	Description	Qty
1	10-0008-00	Cabinet Metal Power Box	1
2	18-7012-00	On/Off Switch Assy	1
a)	10-0087-00	On/Off Switch Mtg Brkt	1
b)	18-3006-00	On/Off Switch, Rocker Style	1
3	22-0001-00	USA Service Outlet, Snap-In	1
4	22-8000-00	Line Fuse Holder	1
USA	170-0110-SR	Fuse, Slow Blow, 10A, 125V, 0.25" x 1.25", 3AG	1
Euro	170-0205-SR	Fuse, Slow Blow, 5A, 250V, 0.25" x 1.25", 3AG	1
NS	180-0000-00	Varistor, USA	1
NS	180-0002-00	Varistor, Europe	1
NS	180-0001-00	Thermistor, USA	1
NS	180-0003-00	Thermistor, Europe	1

Backbox Speaker Bar Assembly 51-5010-01



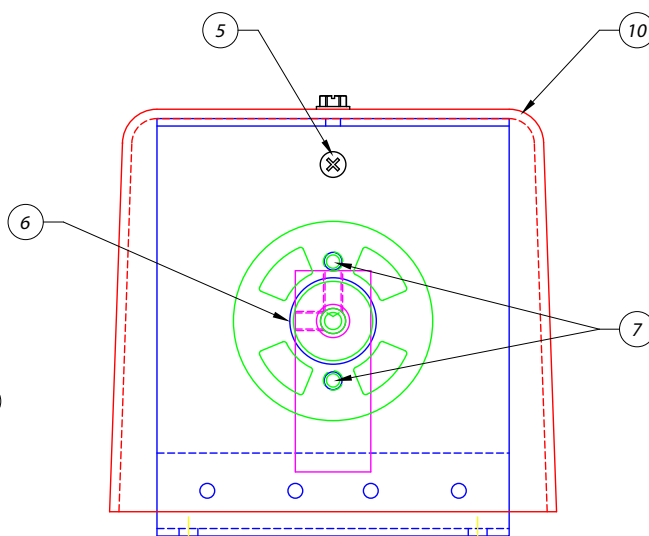
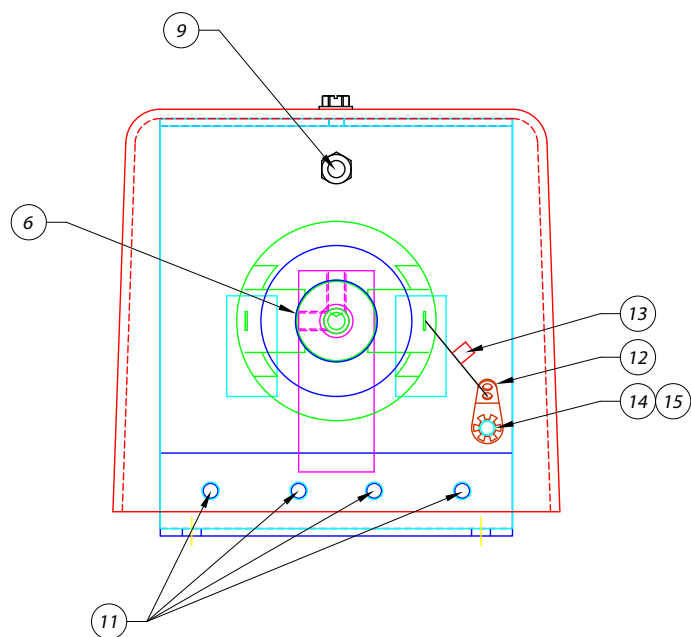
Item	Part Number	Description	Qty
1	05-3002-01	Speaker Box Enclosure	2
2	10-0066-00	Speaker Bar Housing, Black	1
3	17-6000-00	2" Mylar Dome Tweeter	2
4	17-6001-00	2.5" Full Range Speaker	4
5	22-8002-00	RCA Jack, Bulkhead, Solder	2
6	82-0106-08	#6 x 1/2" PPH SMS, Black	24

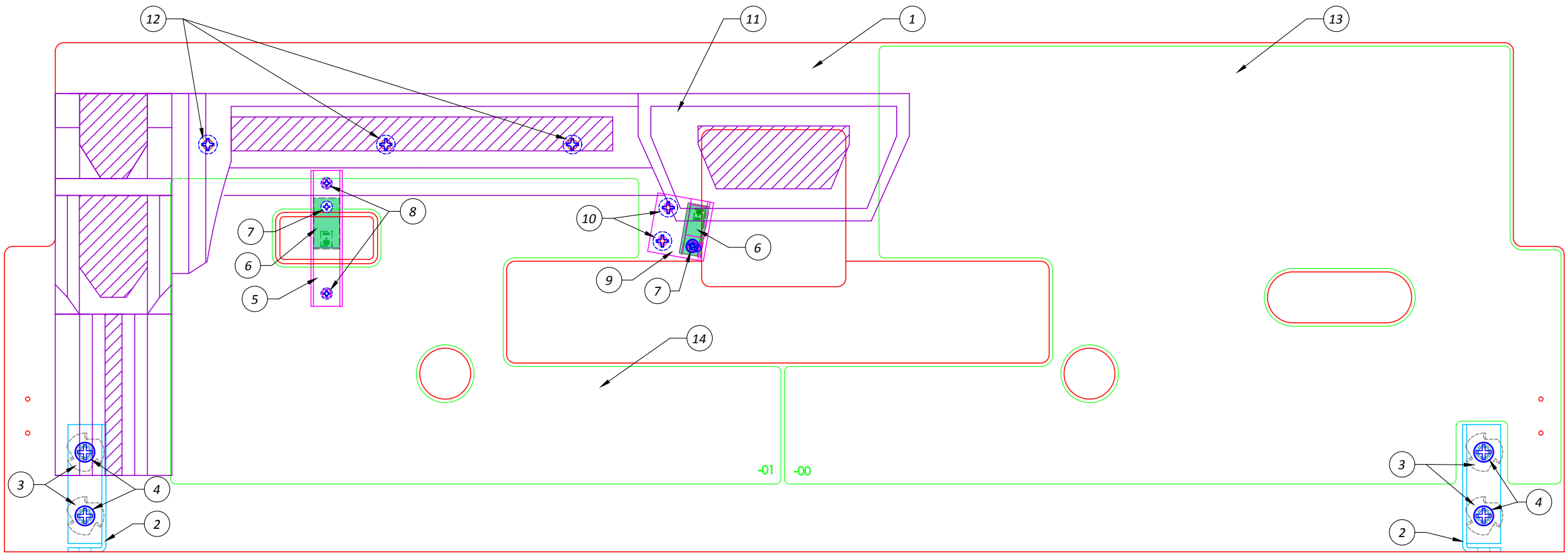
Item	Part Number	Description	Qty
7	82-6104-10	#4 x 5/8" PFH SMS, w/Undercut, Black	32
8	42-2002-00	Backbox Lock Assy	1
9	108-001M-250	Capacitor, 1µF, 250V, 25%, Audio Grade	2
10	70-9004-00	Acoustafoam	2
11	62-0011-26	Hobbit Speaker Bar Decal	1



Shaker Motor Assembly 51-005027-01

Item	Part Number	Description	Qty
1	10-005006-02	Shaker Motor Mtg Brkt	1
2	10-005006-03	Shaker Motor Front Brkt	1
3	23-005003-01	Shaker Motor	1
4	11-000010-00	Eccentric Weight	2
5	80-000006-48	6-32 x 3" PPH MS	1
6	95-004000-00	Insulator Washer	2
7	80-000010-08	10-32 x 1/2" PPH MS	2
8	85-004008-04	8-32 x 1/4" Set Screw, Black	2
9	91-000006-00	6-32 Nylon Stop Nut	1
10	30-000011-00	Shaker Motor Plastic Cover, White	1
11	80-002008-04	8-32 x 1/4" HWH Phillips MS, Serrated	6
12	90-000007-00	#8 Terminal Lockwasher, Angled	1
13	109-00100M-050	Capacitor, Elect (Radial), 100μF, 50V, 20%	1
14	80-002008-06	8-32 x 3/8" HWH Phillips MS, Serrated	1
15	91-002008-00	8-32 Hex Nut	1



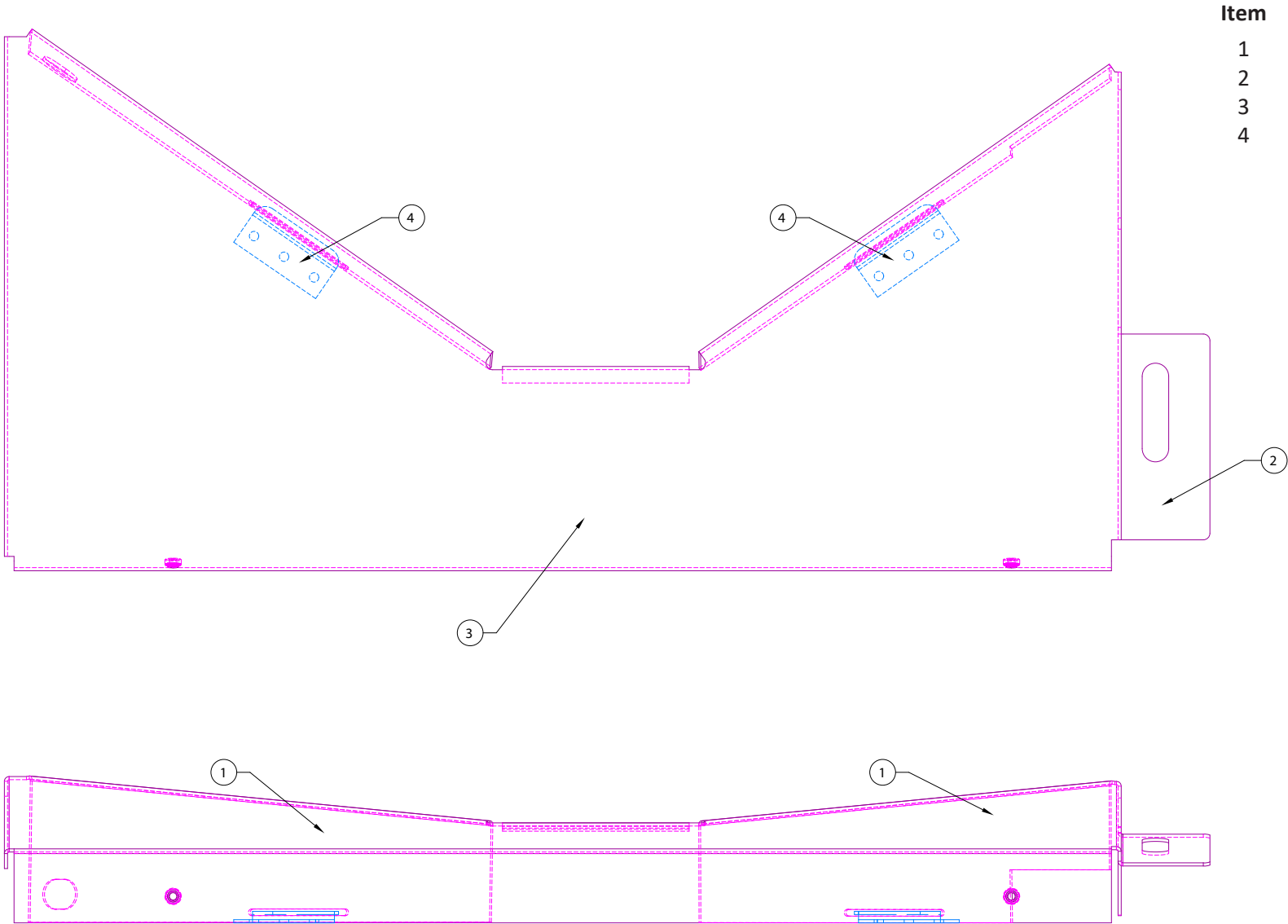


Hobbit Back Panel Assembly
51-5031-00

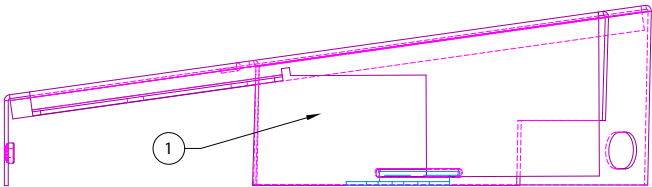
Item	Part Number	Description	Qty
1	05-9004-00	Hobbit Back Panel Wood	1
2	10-0162-00	Back Panel Support Brkt	2
3	91-4008-00	8-32 x 1/4" T-Nut, 1/2" Flange	4
4	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	4
5	10-0177-00	Flasher/GI Mtg Brkt, Steel	1
6	15-0027-00	GI LED Board	2
7	80-0004-03	4-40 x 3/16" PPH MS	2

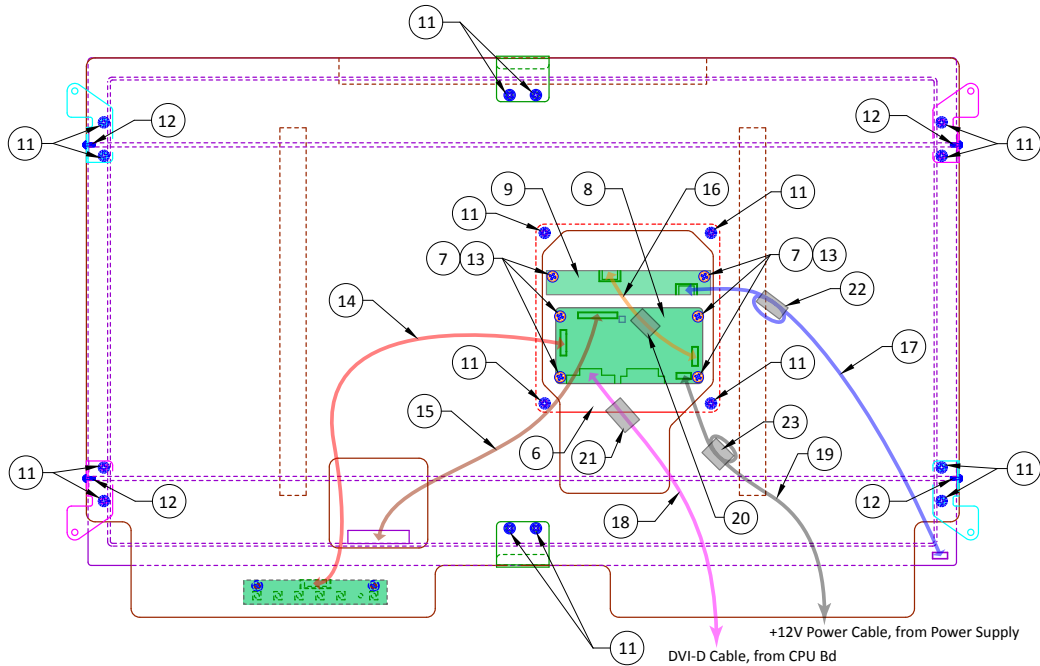
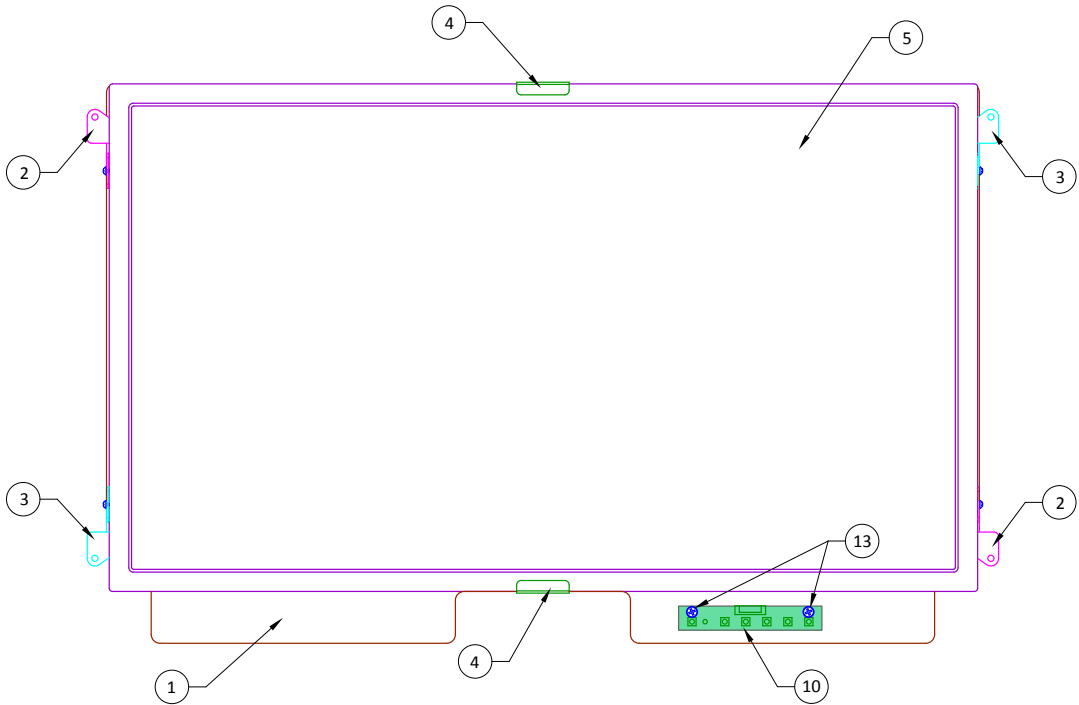
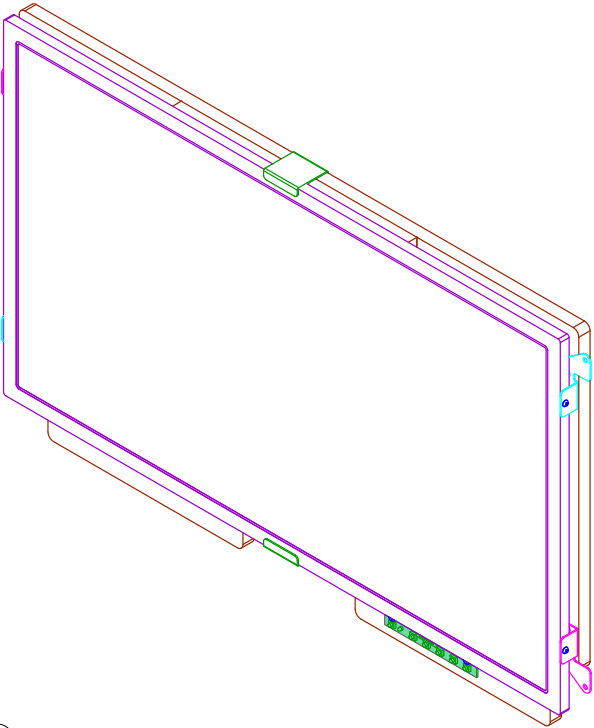
Item	Part Number	Description	Qty
8	82-0004-06	#4 x 3/8" PPH SMS	2
9	10-0179-00	Flasher/GI Mtg Brkt, 45 deg	1
10	82-2006-06	#6 x 3/8" HWH Phillips SMS	2
11	32-0034-00	Hobbit Back Panel Pillar Sculpture	1
12	82-6006-20	#6 x 1-1/4" PFH SMS, w/Undercut	3
13	62-0018-00	Hobbit Back Panel Decal, Right Side	1
14	62-0018-01	Hobbit Back Panel Decal, Left Side	1

Hobbit Bottom Arch Assembly
52-0037-00



Item	Part Number	Description	Qty
1	10-0091-01	Hobbit Bottom Arch, Black	1
2	62-0011-14	Hobbit Shooter Gauge Decal	1
3	62-0014-01	Hobbit Bottom Arch Decal	1
4	10-0092-00	Bottom Arch Retainer Brkt, Black	2

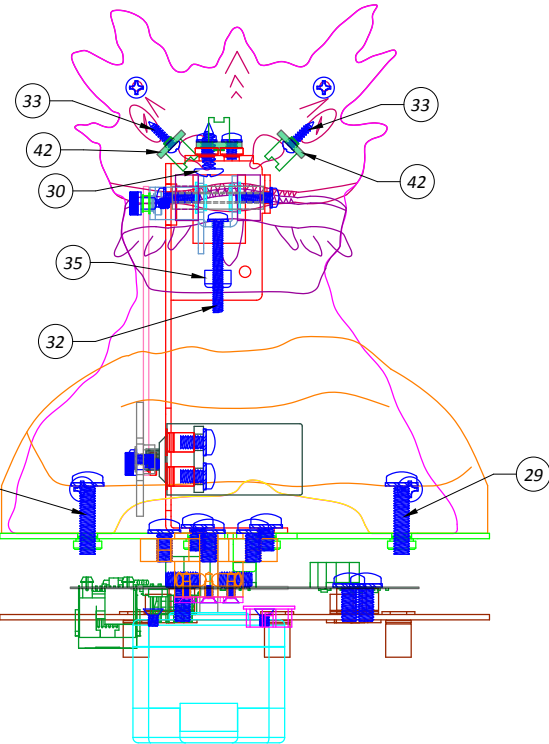
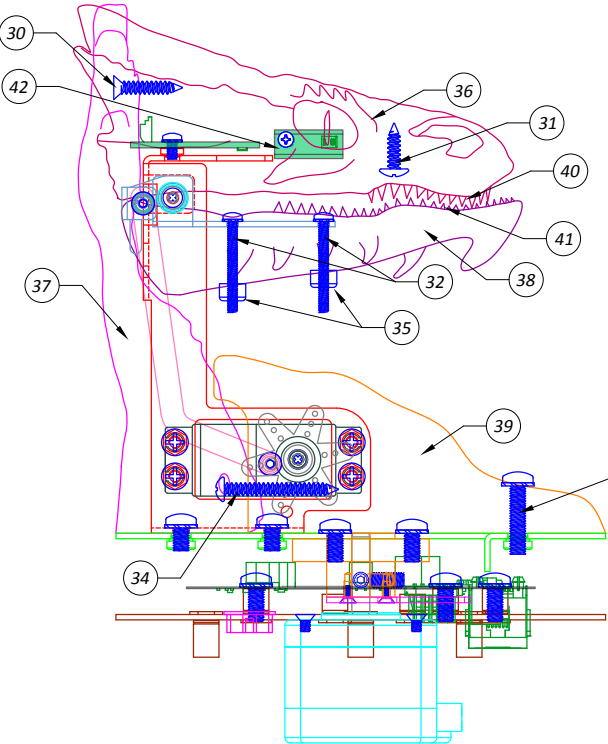
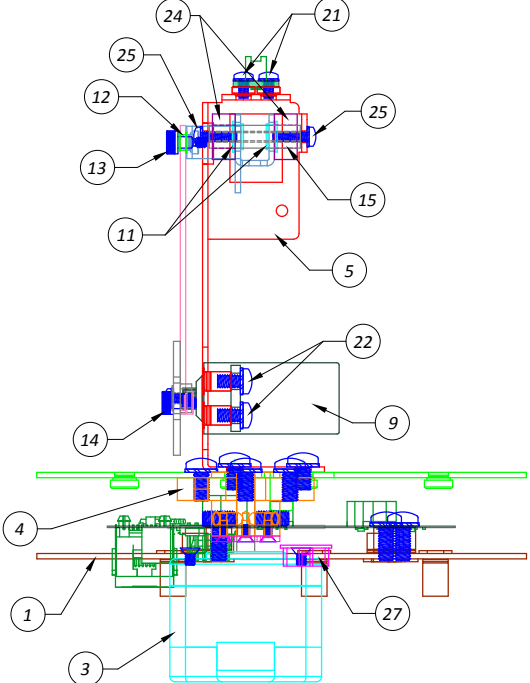
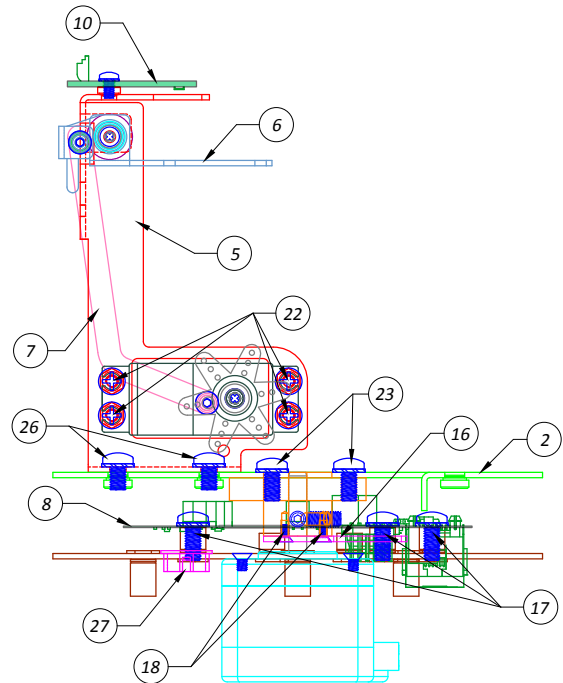
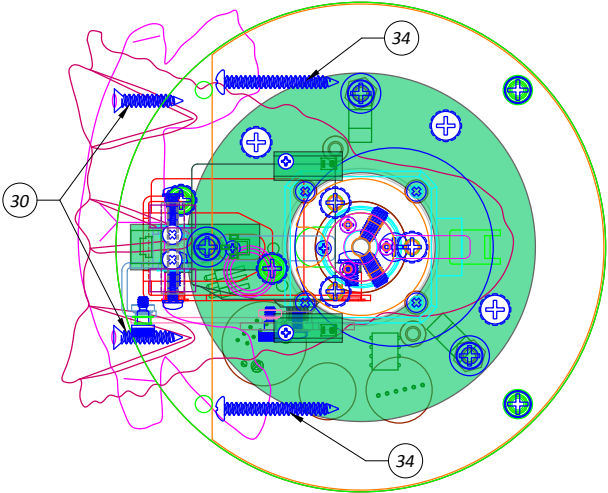
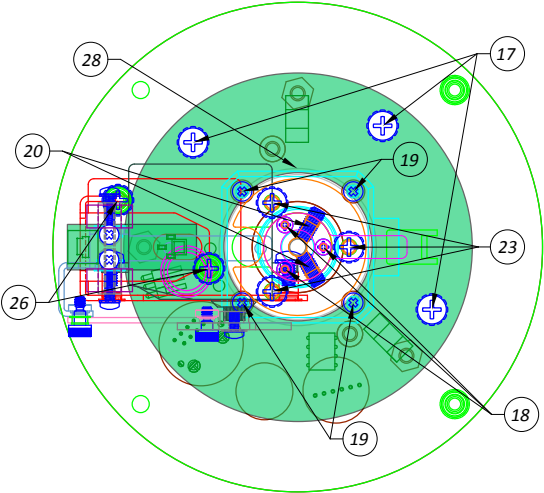




27" LCD Panel Assembly 51-5032-00

Item	Part Number	Description	Qty
1	05-3005-00	27" LCD Wood Panel	1
2	10-0137-01	27" LCD Panel Mtg Brkt, Left	2
3	10-0137-00	27" LCD Panel Mtg Brkt, Right	2
4	10-0136-00	27" LCD Panel Retainer Brkt	1
5	17-0000-01	27" LCD Panel, Open Frame	2
6	10-0138-00	27" LCD Panel PCB Mtg Plate	1
7	94-3009-00	1/4" PCB Standoff, Nylon	6
8	15-0020-00	27" LCD Controller Bd	1
9	15-0021-00	27" LCD Backlight Drvr Bd	1
10	15-0022-00	27" LCD Adjustment Keypad	1
11	80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	16
12	80-00M3-06	M3 x 6mm PPH MS	4

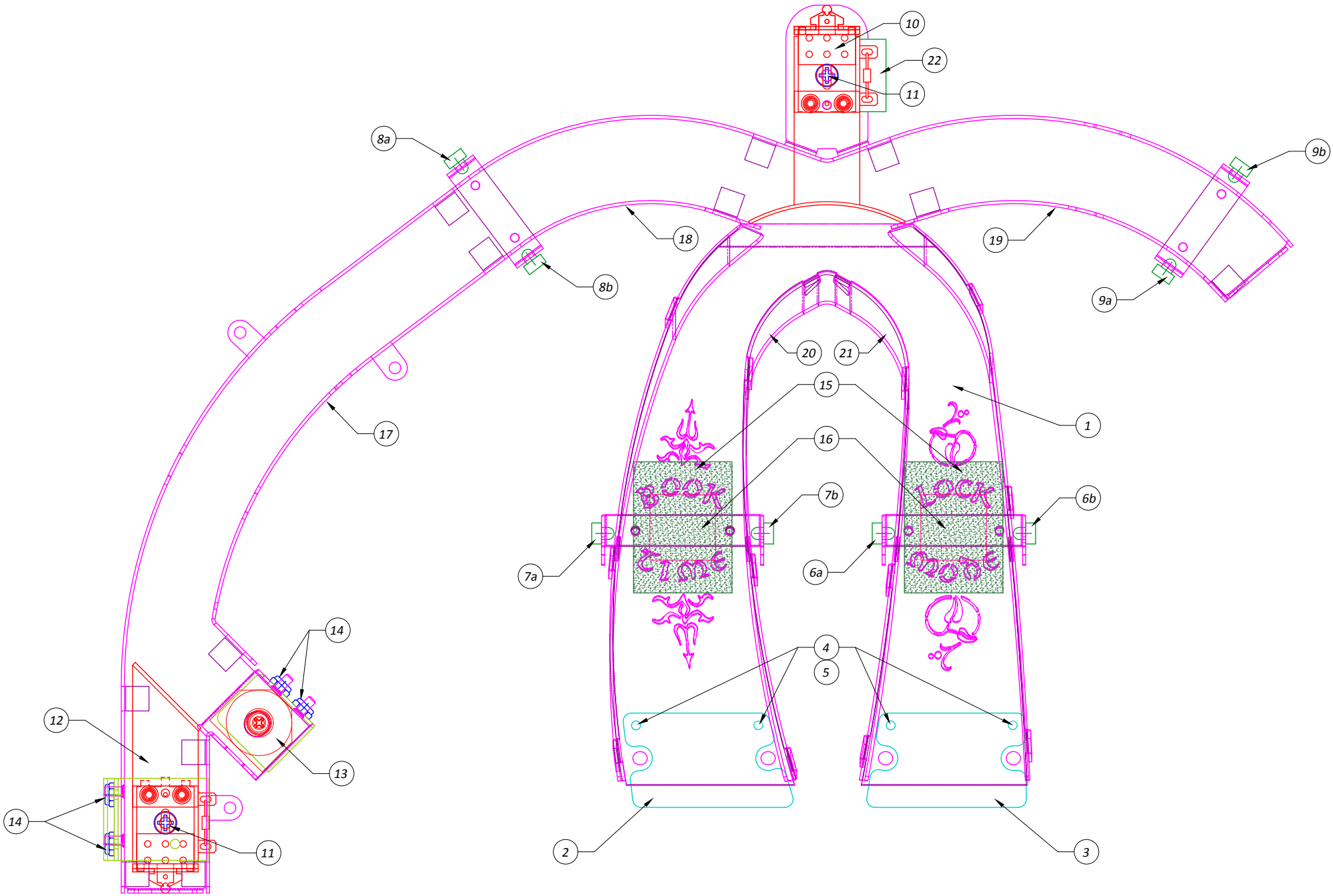
Item	Part Number	Description	Qty
13	82-0004-08	#4 x 1/2" PPH SMS	8
14	19-3066-00	27" LCD Adjustment Keypad Cable	1
15	19-3067-00	27" LCD LVDS Cable, 25cm	1
16	19-3069-00	27" LCD Backlight Drvr Bd Input Cable, 13cm	1
17	19-3070-00	27" LCD Backlight Drvr Bd Output Cable, 36cm	1
18	19-3112-06	DVI-D Cable, Shielded, M-M, 6ft	1
19	19-3072-01	27" LCD Power Cable, Shielded	1
20	195-0001-00	Snap-on Ferrite Bead, 190Ω at 100MHz, 0.4" ID	1
21	195-0003-00	Snap-on Ferrite Bead, 275Ω at 250MHz, 0.4" ID	1
22	195-0005-00	Snap-on Ferrite Bead, 160Ω at 100MHz, 0.32" ID	1
23	195-0012-00	Solid Ferrite Core, 212Ω at 100MHz, 0.51" ID	1



Hobbit Smaug Assemblies

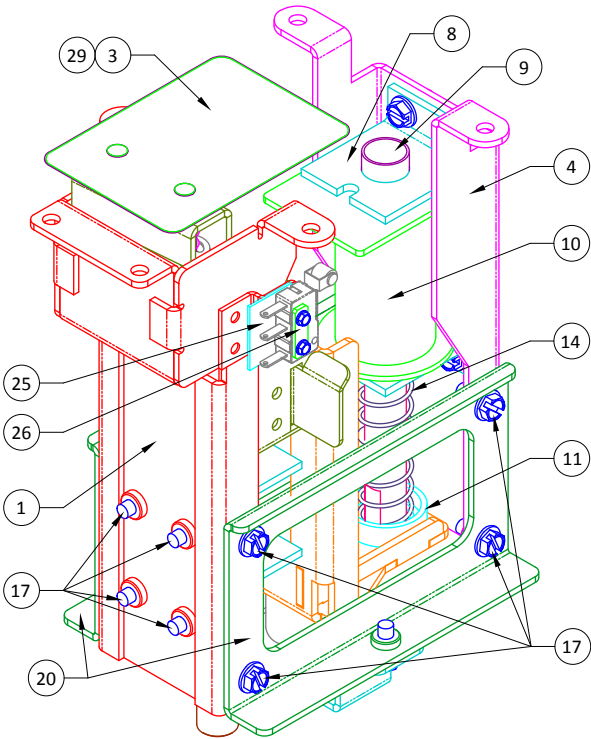
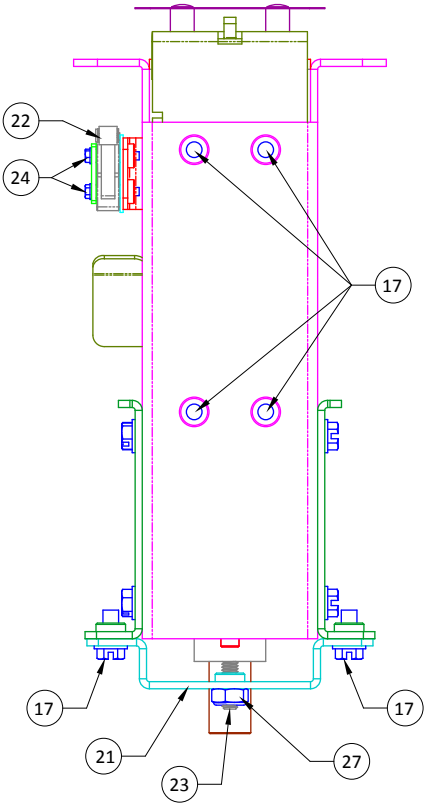
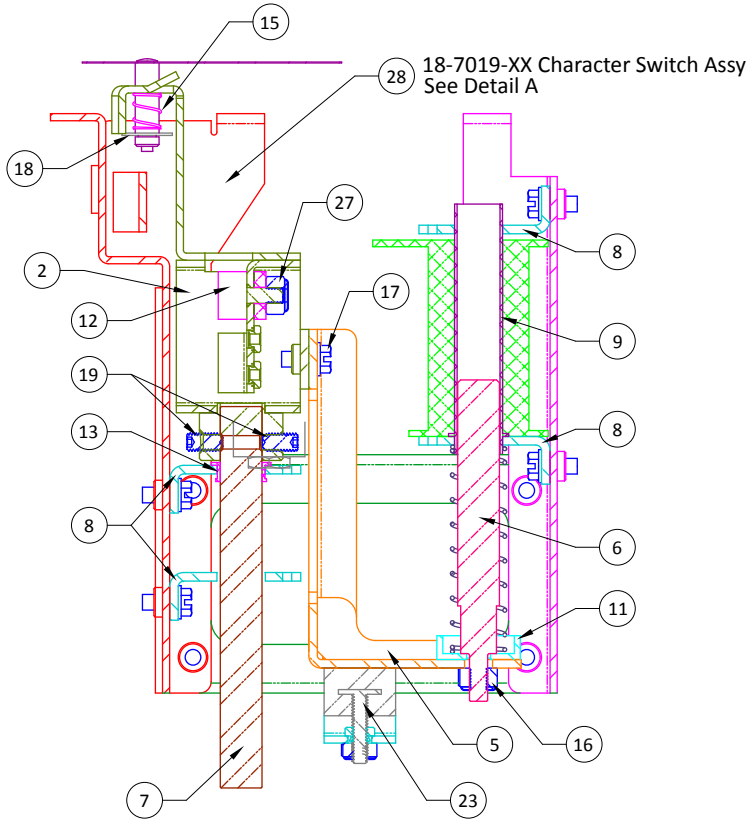
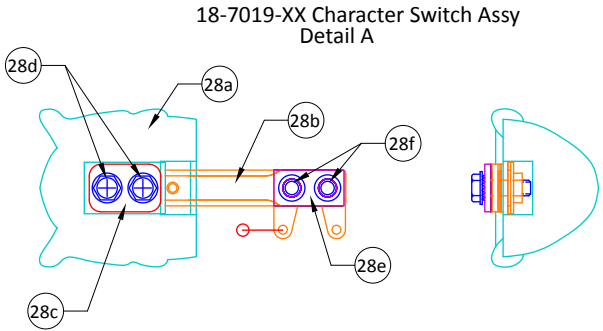
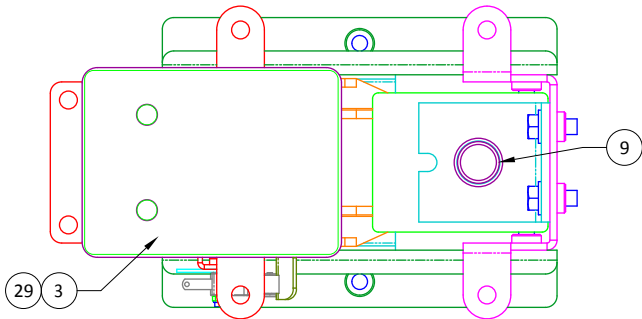
52-0038-00, 52-0038-01

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	10-0169-00	Hobbit Smaug Bottom Plate	1	25	80-0004-06	4-40 X 3/8" PPH MS	2
2	10-0172-00	Hobbit Smaug Top Plate	1	26	80-0008-04	8-32 x 1/4" PPH MS	2
3	23-5007-00	Hobbit Smaug Stepper Motor	1	27	30-0108-00	1/2" Locking Grommet	1
4	11-0037-00	Hobbit Smaug Hub	1	28	30-8005-00	Plastic Edge Trim w/Adhesive	.417 ft
5	10-0173-00	Hobbit Smaug Main Support Brkt	1	29	80-0308-12	8-32 x 3/4" PPH MS, Brass	2
6	10-0174-00	Hobbit Smaug Jaw Brkt	1	30	82-6006-12	#6 x 3/4" PFH SMS, w/Undercut	2
7	10-0175-00	Hobbit Smaug Jaw Crank Link	1	31	82-7006-08	#6 x 1/2" TH Phillips SMS	1
8	15-0035-00	Hobbit Smaug Controller Board	1	32	80-0004-16	4-40 x 1" PPH MS	2
9	23-5008-00	Hobbit Smaug Jaw Servo Motor	1	33	82-0004-06	#4 x 3/8" PPH SMS	2
10	15-0028-0X	Single RGB LED Bd	1	34	82-0006-20	#6 x 1- 1/4" PPH SMS	2
11	30-0071-00	4L1-FF Snap-In Nyliner	2	35	91-0004-00	4-40 Nylon Stop Nut	2
12	30-0070-00	2L1-FF Snap-In Nyliner	1	36	LE 32-0020-00	Hobbit Smaug Head Sculpture, Red	1
13	85-0002-00	4-40 x 1/8" x 5/32" SH Shoulder Bolt	1	SE	32-0020-01	Hobbit Smaug Head Sculpture, Gold	1
14	85-0004-00	4-40 x 1/8" x 3/32" SH Shoulder Bolt	1	Std	32-0020-00	Hobbit Smaug Head Sculpture, Red	1
15	94-3013-00	1/4" x 1" Round Spacer, F-F, 4-40, Zinc	1	37	LE 32-0028-00	Hobbit Smaug Back Sculpture, Red	1
16	10-0171-00	Hobbit Smaug Rotating Stepper Limiter	1	SE	32-0028-01	Hobbit Smaug Back Sculpture, Gold	1
17	80-1008-06	8-32 x 3/8" PPH MS, SEMS	3	Std	32-0028-00	Hobbit Smaug Back Sculpture, Red	1
18	80-6102-03	2-56 x 3/16" PFH MS, w/Undercut	3	38	LE 32-0029-00	Hobbit Smaug Jaw Sculpture, Red	1
19	80-61M3-03	M3 x 3/16" PFH MS, w/Undercut	4	SE	32-0029-01	Hobbit Smaug Jaw Sculpture, Gold	1
20	85-4008-06	8-32 x 3/8" Set Screw, Cup Point, Black	2	Std	32-0029-00	Hobbit Smaug Jaw Sculpture, Red	1
21	80-0004-03	4-40 x 3/16" PPH MS	2	39	32-0035-00	Hobbit Smaug Gold Pile Sculpture	1
22	80-0006-04	6-32 x 1/4" PPH MS	4	40	32-0038-00	Hobbit Smaug Upper Teeth Sculpture	1
23	80-0008-05	8-32 x 5/16" PPH MS	3	41	32-0039-00	Hobbit Smaug Lower Teeth/Tongue Sculpture	1
24	94-3014-00	1/2" x 1/4" Round Spacer, Nylon	2	42	15-0027-00	GI LED Bd	2



Hobbit Steel Ramp Assembly 52-0042-00

Item	Part Number	Description	Qty
1	10-9005-00	Hobbit Steel Ramp	1
2	11-6005-00	Hobbit Ramp Flap, Left	1
3	11-6005-01	Hobbit Ramp Flap, Right	1
4	93-0003-00	1/8" x 5/32" Semi-Tubular Rivet, TH	4
5	92-0004-00	#4 Flat Washer (Behind Ramp)	4
6	18-7020-17-04	Opto Pair Assy, 17" Cable, YEL	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1
7	18-7020-14-05	Opto Pair Assy, 14" Cable, GRN	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1
8	18-7020-14-03	Opto Pair Assy, 14" Cable, ORN	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1
9	18-7020-20-02	Opto Pair Assy, 20" Cable, RED	1
a)	18-5001-00	Infrared LED Assy	1
b)	18-5001-01	Phototransistor Assy	1
10	51-5036-00	Ramp U-Turn Diverter Assy	1
11	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	2
12	51-5035-00	Smaug Feed Diverter Assy	1
13	51-5034-00	Ramp Hold Magnet Assy	1
14	91-0006-00	6-32 Nylon Stop Nut	4
15	30-0078-00	Light Diffuser Plastic	2
16	61-9006-00	VHB Adhesive Tape, Two-Sided, 1/4"	2
17	62-0014-02	Hobbit Steel Ramp Decal, Upper Left Side, Left	1
18	62-0014-03	Hobbit Steel Ramp Decal, Upper Left Side, Right	1
19	62-0014-04	Hobbit Steel Ramp Decal, Upper Right Side	1
20	62-0014-05	Hobbit Steel Ramp Decal, Inside Loop, Left	1
21	62-0014-06	Hobbit Steel Ramp Decal, Inside Loop, Right	1
22	70-9002-01	Mini Coil Insulator, Fish Paper	1

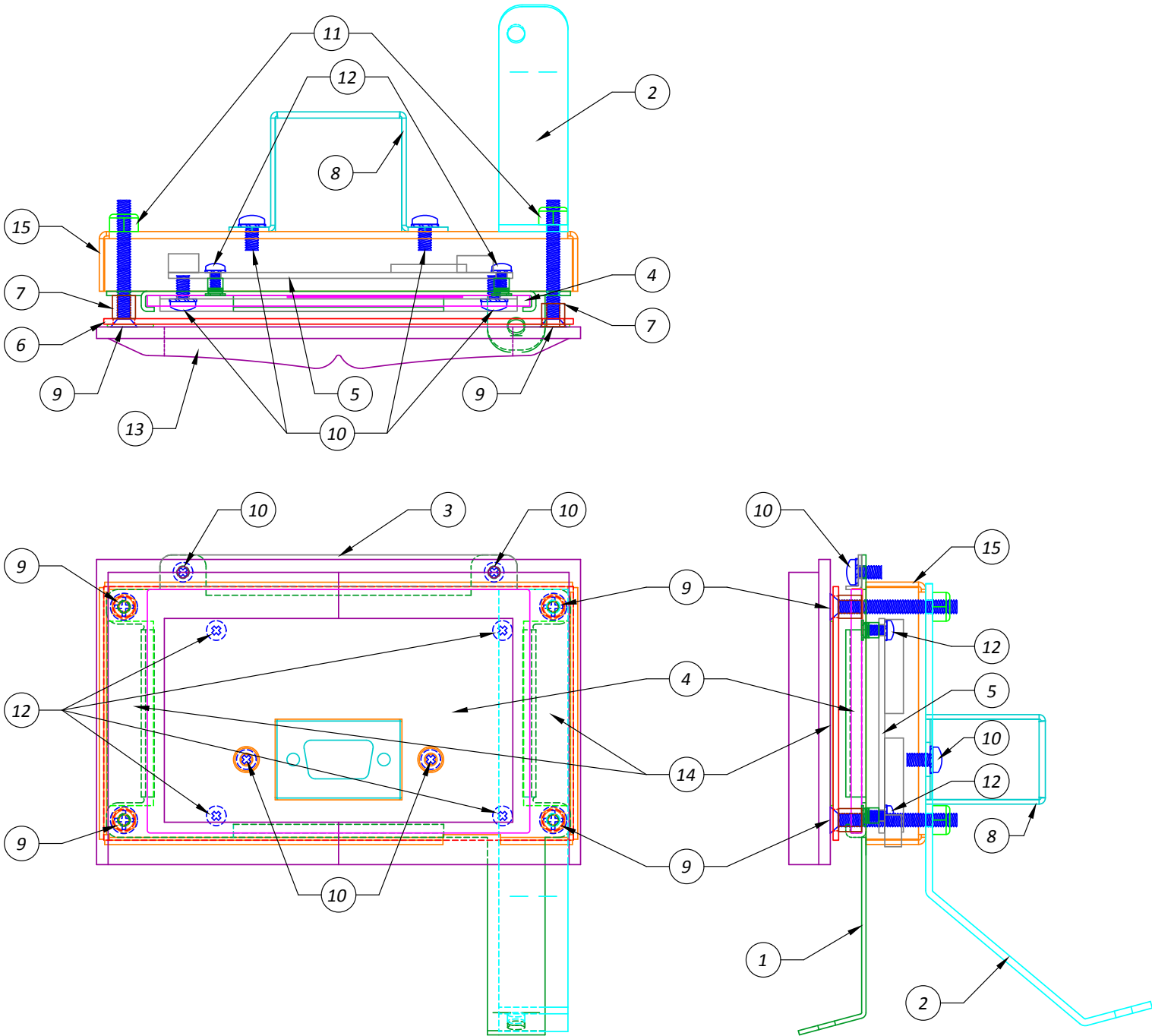


Hobbit Pop-Up Assemblies

52-0044-00, 52-0044-01, 52-0044-02, 52-0044-03

Item	Part Number	Description	Qty
1	10-5021-00	Pop-Up Main Brkt	1
2	10-5022-00	Pop-Up Carriage Brkt	1
3	11-6004-00	Pop-Up Spring Steel Flap	1
4	10-0154-00	Pop-Up Coil Brkt	1
5	10-0152-00	Pop-Up Carriage/Plunger Brkt Union	1
6	11-0034-00	Pop-Up Coil Plunger	1
7	11-0035-00	Pop-Up Guide Shaft	1
8	10-7002-01	Flipper Coil Centering Brkt, 1-Way	4
9	30-0014-42-1	2-5/8" Coil Tubing, Flanged	1
10	23-2004-01	FL-11753 Flipper Coil, Lugless	1
11	11-0013-00	Bell Armature Stop	1
12	30-0055-00	Pop-Up Character Switch Locator	1
13	30-0059-00	Double Flange Clip Bearing, 0.4375" Bore	1
14	13-7004-00	Slingshot Plunger Return Spring	1
15	13-7008-01	Pop-Up Flap Compression Spring	2
16	91-0010-00	10-32 Nylon Stop Nut	3
17	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	20
18	13-9002-00	Hairpin Clip	2
19	85-4010-06	10-32 x 3/8" Set Screw, Cup Point	2
20	10-0153-00	Pop-Up Slide Plate	2
21	10-0182-00	Pop-Up Adjustable Stop Brkt	1

Item	Part Number	Description	Qty
22	18-3005-01	Microswitch w/Internal Roller Actuator	1
23	98-0011-00	Rubber Bumper w/Stud, 8-32	1
24	80-2102-08	2-56 x 1/2" HWH MS, Black	2
25	70-9002-00	Microswitch Insulator, Fish Paper	1
26	10-0024-01	Microswitch Protector Plate, #2	1
27	91-0008-00	8-32 Nylon Stop Nut	2
28	18-7019-0X	Pop-Up Character Switch Assy	1
a)	32-0021-00	Hobbit Pop-Up Goblin Head Sculpture (-02)	1
	32-0022-00	Hobbit Pop-Up Orc Head Sculpture (-03)	1
	32-0023-00	Hobbit Pop-Up Warg Head Sculpture (-01)	1
	32-0024-00	Hobbit Pop-Up Spider Head Sculpture (-00)	1
b)	18-0006-00	Pop-Up Character Leaf Switch	1
c)	10-0113-00	Pop-Up Character Switch Protector	1
d)	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	2
e)	10-0022-01	Curved Switch Plate	1
f)	80-2006-10	6-32 x 5/8" HWH Phillips MS, Serrated	2
29	62-0011-09	Hobbit Goblin Pop-Up Flap Decal (-02)	1
	62-0011-10	Hobbit Orc Pop-Up Flap Decal (-03)	1
	62-0011-12	Hobbit Spider Pop-Up Flap Decal (-00)	1
	62-0011-12	Hobbit Warg Pop-Up Flap Decal (-01)	1



Hobbit Book LCD Assembly

52-0045-00

Item	Part Number	Description	Qty
1	10-5034-00	Book LCD Mtg Brkt, Front	1
2	10-0176-00	Book LCD Mtg Brkt, Rear	1
3	10-0166-00	Book LCD Retaining Brkt	1
4	17-0004-00	4.3" LCD Screen	1
5	15-0038-00	4.3" LCD Driver Board	1
6	30-0066-00	Book LCD Front Shield	1
7	30-0081-00	Nylon Round Spacer, #6 x 1/4"	4
8	10-0193-01	Book LCD EMI Shield VGA Bulkhead Mtg Brkt	1
9	80-6106-22	6-32 x 1-3/8" PFH MS, w/Undercut	4
10	80-0006-04	6-32 x 1/4" PPH MS	4
11	91-1006-00	6-32 Keps Nut	4
12	80-0404-03	4-40 x 3/16" PPH MS, Nylon	4
13	32-0027-00	Hobbit Book LCD Frame	1
14	61-9007-00	VHB Adhesive Tape, Two-Sided, 1/2"	4"
15	10-0193-00	Book LCD EMI Shield	1

Coil, Motor & Light Table (1 of 3)

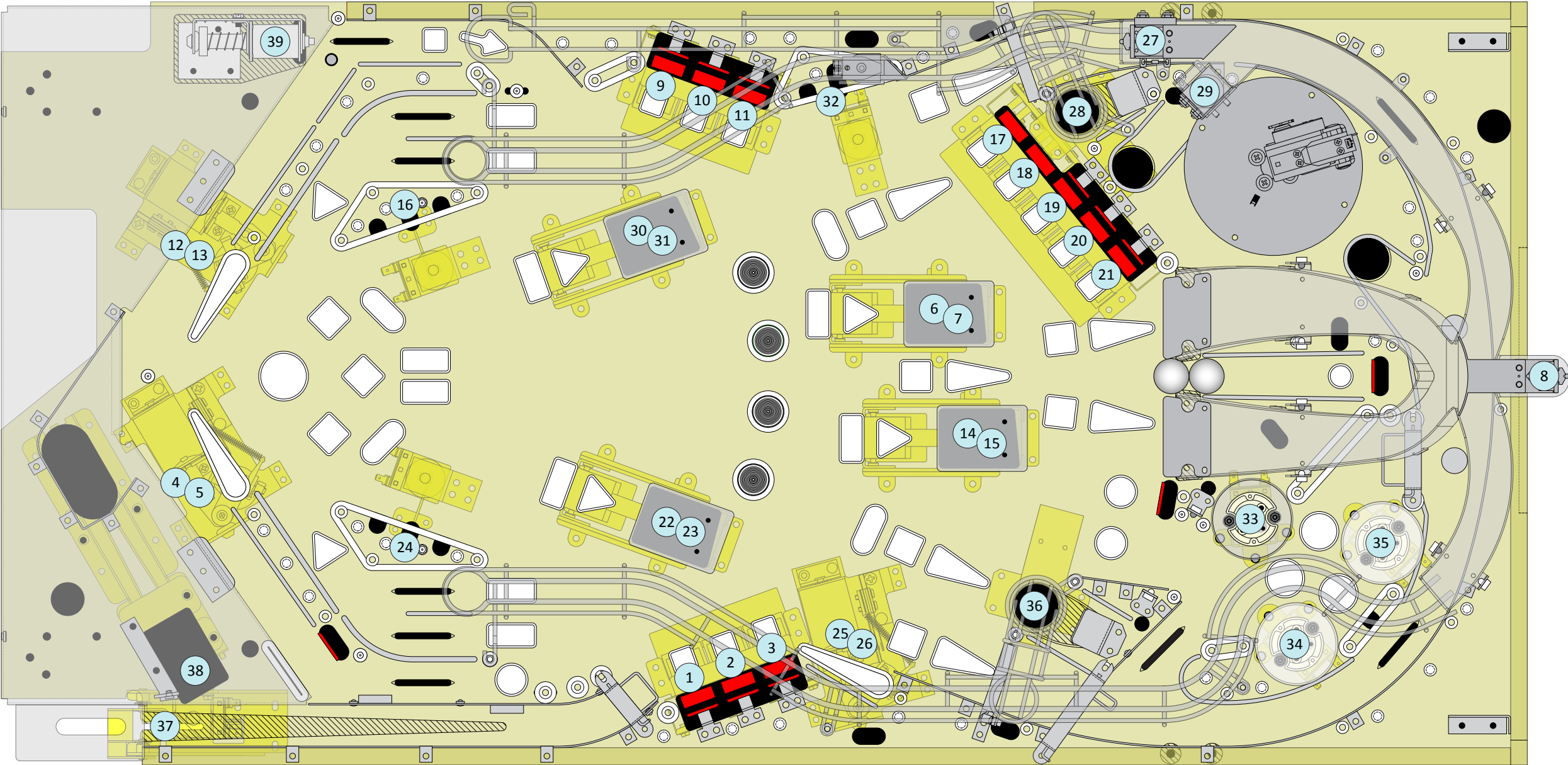
Drive #	Coil Function	Coil Type	I/O Bd Power Source	I/O Bd Drive Details	Fuses	Part Number	Part of Assembly	Drawing
1	MAN Drop Target Reset (Up)	26-1200	BRN, J104-1, 70V	BRN-BLK, J104-9, Q308	F701, F704	23-0010-00	51-0015-00	C-26
2	MAN Drop Target Reset (Up)	26-1200	BRN, J104-1, 70V	BRN-GRY, J104-8, Q307	F701, F704	23-0010-00	51-0015-00	C-26
3	MAN Drop Target Reset (Up)	26-1200	BRN, J104-1, 70V	BRN-RED, J104-7, Q306	F701, F704	23-0010-00	51-0015-00	C-26
4	Right Flipper Power	FL-15411	BRN, J104-1, 70V	BRN-ORN, J104-6, Q305	F701, F704	23-2003-00	51-0001-00	C-18
5	Right Flipper Hold	FL-15411	BRN, J104-1, 70V	BRN-YEL, J104-5, Q304	F701, F704	23-2003-00	51-0001-00	C-18
6	Goblin Pop-Up Power	FL-11753, Lugless	BRN, J104-1, 70V	BRN-GRN, J104-4, Q303	F701, F704	23-2004-01	52-0044-02	C-50
7	Goblin Pop-Up Hold	FL-11753, Lugless	BRN, J104-1, 70V	BRN-BLU, J104-3, Q302	F701, F704	23-2004-01	52-0044-02	C-50
8	Ramp U-Turn Diverter	32-1800, Mini	BRN, J104-1, 70V	BRN-VIO, J104-2, Q301	F701, F704	23-3007-00	51-5036-00	C-48
9	ELF Drop Target Reset (Up)	26-1200	RED, J105-1, 70V	RED-BLK, J105-10, Q318	F701, F705	23-0010-00	51-0015-01	C-26
10	ELF Drop Target Reset (Up)	26-1200	RED, J105-1, 70V	RED-BRN, J105-8, Q317	F701, F705	23-0010-00	51-0015-01	C-26
11	ELF Drop Target Reset (Up)	26-1200	RED, J105-1, 70V	RED-GRY, J105-7, Q316	F701, F705	23-0010-00	51-0015-01	C-26
12	Left Flipper Power	FL-15411	RED, J105-1, 70V	RED-ORN, J105-6, Q315	F701, F705	23-2003-00	51-0002-00	C-19
13	Left Flipper Hold	FL-15411	RED, J105-1, 70V	RED-YEL, J105-5, Q314	F701, F705	23-2003-00	51-0002-00	C-19
14	Orc Pop-Up Power	FL-11753, Lugless	RED, J105-1, 70V	RED-GRN, J105-4, Q313	F701, F705	23-2004-01	52-0044-03	C-50
15	Orc Pop-Up Hold	FL-11753, Lugless	RED, J105-1, 70V	RED-BLU, J105-3, Q312	F701, F705	23-2004-01	52-0044-03	C-50
16	Left Slingshot	26-1200	RED, J105-1, 70V	RED-VIO, J105-2, Q311	F701, F705	23-0010-00	51-0003-01	C-20
17	DWARF Drop Target Reset (Up)	26-1200	ORN, J106-1, 70V	ORN-BLK, J106-10, Q328	F701, F706	23-0010-00	51-0017-00	C-28
18	DWARF Drop Target Reset (Up)	26-1200	ORN, J106-1, 70V	ORN-BRN, J106-9, Q327	F701, F706	23-0010-00	51-0017-00	C-28
19	DWARF Drop Target Reset (Up)	26-1200	ORN, J106-1, 70V	ORN-RED, J106-7, Q326	F701, F706	23-0010-00	51-0017-00	C-28
20	DWARF Drop Target Reset (Up)	26-1200	ORN, J106-1, 70V	ORN-GRY, J106-6, Q325	F701, F706	23-0010-00	51-0017-00	C-28
21	DWARF Drop Target Reset (Up)	26-1200	ORN, J106-1, 70V	ORN-YEL, J106-5, Q324	F701, F706	23-0010-00	51-0017-00	C-28
22	Warg Pop-Up Power	FL-11753, Lugless	ORN, J106-1, 70V	ORN-GRN, J106-4, Q323	F701, F706	23-2004-01	52-0044-01	C-50
23	Warg Pop-Up Hold	FL-11753, Lugless	ORN, J106-1, 70V	ORN-BLU, J106-3, Q322	F701, F706	23-2004-01	52-0044-01	C-50
24	Right Slingshot	26-1200	ORN, J106-1, 70V	ORN-VIO, J106-2, Q321	F701, F706	23-0010-00	51-0003-02	C-20
25	Upper Right Flipper Power	FL-15411	TAN, J107-1, 70V	TAN-BLK, J107-10, Q338	F702, F707	23-2003-00	51-0001-13	C-18
26	Upper Right Flipper Hold	FL-15411	TAN, J107-1, 70V	TAN-BRN, J107-9, Q337	F702, F707	23-2003-00	51-0001-13	C-18
27	Smaug Feed Diverter	32-1800, Mini	TAN, J107-1, 70V	TAN-RED, J107-8, Q336	F702, F707	23-3007-00	51-5035-00	C-48
28	Balin VUK	23-800	TAN, J107-1, 70V	TAN-ORN, J107-6, Q335	F702, F707	23-0003-00	51-0012-01	C-25
29	Ramp Hold Magnet	29-900, Mini	TAN, J107-1, 70V	TAN-YEL, J107-5, Q334	F702, F707	23-3014-00	51-5034-00	C-48
30	Spider Pop-Up Power	FL-11753, Lugless	TAN, J107-1, 70V	TAN-GRN, J107-4, Q333	F702, F707	23-2004-01	52-0044-00	C-50
31	Spider Pop-Up Hold	FL-11753, Lugless	TAN, J107-1, 70V	TAN-BLU, J107-3, Q332	F702, F707	23-2004-01	52-0044-00	C-50
32	Upper Slingshot	26-1200	TAN, J107-1, 70V	TAN-VIO, J107-2, Q331	F702, F707	23-0010-00	51-0003-03	C-20

Coil, Motor & Light Table (2 of 3)

Drive #	Coil Function	Coil Type	I/O Bd Power Source	I/O Bd Drive Details	Fuses	Part Number	Part of Assembly	Drawing
33	Left Pop Bumper	26-1200	PNK, J108-1, 70V	PNK-BLK, J108-10, Q408	F702, F708	23-0010-00	51-0004-01	C-22
34	Right Pop Bumper	26-1200	PNK, J108-1, 70V	PNK-BRN, J108-9, Q407	F702, F708	23-0010-00	51-0004-01	C-22
35	Upper Pop Bumper	26-1200	PNK, J108-1, 70V	PNK-RED, J108-8, Q406	F702, F708	23-0010-00	51-0004-01	C-22
36	Radagast VUK	23-800	PNK, J108-1, 70V	PNK-ORN, J108-7, Q405	F702, F708	23-0003-00	51-0012-00	C-24
37	Ball Auto-Launch	23-800	PNK, J108-1, 70V	PNK-YEL, J108-5, Q404	F702, F708	23-0003-00	51-0026-00	C-32
38	5-Ball Trough VUK	26-1200	PNK, J108-1, 70V	PNK-GRN, J108-4, Q403	F702, F708	23-0010-00	51-0021-00	C-30
39	Windlance Shot/Kickback	23-800	PNK, J108-1, 70V	PNK-BLU, J108-3, Q402	F702, F708	23-0003-00	51-0025-00	C-31
40	Knocker (in backbox)	23-800	PNK, J108-1, 70V	PNK-VIO, J108-2, Q401	F702, F708	23-0003-00	51-0032-01	C-35
41	Spotlights, Lower	LEDs (2)	YEL, J109-1, 12V	YEL-BLK, J109-2, Q411	F714, F709	24-0017-00	30-0047-00	-
42	Shaker Motor	Motor	YEL, J109-1, 12V	YEL-BRN, J109-3, Q412	F714, F709	23-5003-01	51-5027-01	C-41
43	Smaug Stepper Motor 1	Motor	YEL, J109-1, 12V	YEL-RED, J109-4, Q413	F714, F709	23-5007-00	52-0038-00	C-46
44	Smaug Stepper Motor 2	Motor	YEL, J109-1, 12V	YEL-ORN, J109-6, Q414	F714, F709	23-5007-00	52-0038-00	C-46
45	Smaug Stepper Motor 3	Motor	YEL, J109-1, 12V	YEL-GRY, J109-7, Q415	F714, F709	23-5007-00	52-0038-00	C-46
46	Smaug Stepper Motor 4	Motor	YEL, J109-1, 12V	YEL-GRN, J109-8, Q416	F714, F709	23-5007-00	52-0038-00	C-46
47	Left Pop Bumper Light	LED	YEL, J109-1, 12V	YEL-BLU, J109-9, Q417	F714, F709	24-0006-13	51-0006-09	C-23
48	Spotlights, Upper	LEDs (2)	YEL, J109-1, 12V	YEL-VIO, J109-10, Q418	F714, F709	24-0017-00	30-0047-01	-
49	ELF Drop Target Retract (Down)	32-1350, Mini	PLM, J110-1, 20V	PLM-BLK, J110-2, Q421	F703, F710	23-3015-00	51-0015-01	C-26
50	ELF Drop Target Retract (Down)	32-1350, Mini	PLM, J110-1, 20V	PLM-BRN, J110-3, Q422	F703, F710	23-3015-00	51-0015-01	C-26
51	ELF Drop Target Retract (Down)	32-1350, Mini	PLM, J110-1, 20V	PLM-RED, J110-5, Q423	F703, F710	23-3015-00	51-0015-01	C-26
52	Not Used	-	-	-	-	-	-	-
53	Top Magnet, Left	22-675, Magnet	PLM, J110-1, 20V	PLM-YEL, J110-7 Q425	F703, F710	23-4005-00	51-0046-00	C-36
54	Top Magnet, Right	22-675, Magnet	PLM, J110-1, 20V	PLM-GRN, J110-8, Q426	F703, F710	23-4005-00	51-0046-00	C-36
55	Not Used	-	-	-	-	-	-	-
56	Not Used	-	-	-	-	-	-	-
57	MAN Drop Target Retract (Down)	32-1350, Mini	BLU, J111-1, 20V	BLU-BLK, J111-2, Q431	F703, F711	23-3015-00	51-0015-00	C-26
58	MAN Drop Target Retract (Down)	32-1350, Mini	BLU, J111-1, 20V	BLU-BRN, J111-4, Q432	F703, F711	23-3015-00	51-0015-00	C-26
59	MAN Drop Target Retract (Down)	32-1350, Mini	BLU, J111-1, 20V	BLU-RED, J111-5, Q433	F703, F711	23-3015-00	51-0015-00	C-26
60	Windlance Up Post	26-1200	BLU, J111-1, 20V	BLU-ORN, J111-6, Q434	F703, F711	23-0010-00	51-0030-00	C-33
61	Subway Diverter	26-1200	BLU, J111-1, 20V	BLU-YEL, J111-7, Q435	F703, F711	23-0010-00	51-0048-00	C-36
62	Windlance Diverter	32-1350, Mini	BLU, J111-1, 20V	BLU-GRN, J111-8, Q436	F703, F711	23-3015-00	51-5038-00	C-48
63	Not Used	-	-	-	-	-	-	-
64	Not Used	-	-	-	-	-	-	-

Coil, Motor & Light Table (3 of 3)

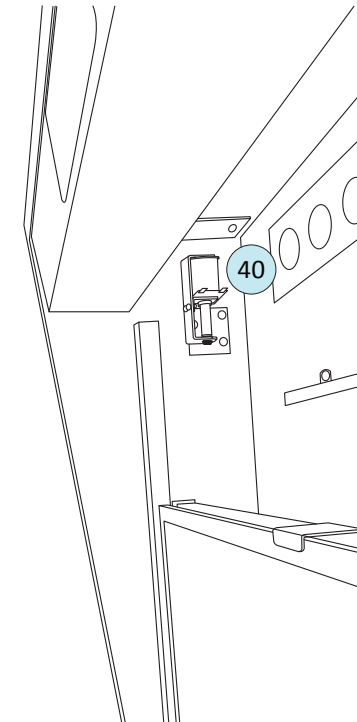
Drive #	Coil Function	Coil Type	I/O Bd Power Source	I/O Bd Drive Details	Fuses	Part Number	Part of Assembly	Drawing
65	DWARF Drop Target Retract (Down)	32-1350, Mini	VIO, J112-1, 20V	VIO-BLK, J112-3, Q501	F703, F712	23-3015-00	51-0017-00	C-28
66	DWARF Drop Target Retract (Down)	32-1350, Mini	VIO, J112-1, 20V	VIO-BRN, J112-4, Q502	F703, F712	23-3015-00	51-0017-00	C-28
67	DWARF Drop Target Retract (Down)	32-1350, Mini	VIO, J112-1, 20V	VIO-RED, J112-5, Q503	F703, F712	23-3015-00	51-0017-00	C-28
68	DWARF Drop Target Retract (Down)	32-1350, Mini	VIO, J112-1, 20V	VIO-ORN, J112-6, Q504	F703, F712	23-3015-00	51-0017-00	C-28
69	DWARF Drop Target Retract (Down)	32-1350, Mini	VIO, J112-1, 20V	VIO-YEL, J112-7, Q505	F703, F712	23-3015-00	51-0017-00	C-28
70	Not Used	-	-	-	-	-	-	-
71	Not Used	-	-	-	-	-	-	-
72	Not Used	-	-	-	-	-	-	-
73	Not Used	-	-	-	-	-	-	-
74	Not Used	-	-	-	-	-	-	-
75	Not Used	-	-	-	-	-	-	-
76	Not Used	-	-	-	-	-	-	-
77	Not Used	-	-	-	-	-	-	-
78	Not Used	-	-	-	-	-	-	-
79	Start Button Light	LED	LT BLU, J113-2, 12V	LT BLU-GRY, J113-9, Q517	F714, F713	24-0017-00	18-7023-04	C-2
80	Redemption Ticket Motor	Motor	LT BLU, J113-2, 12V	LT BLU-VIO, J113-10, Q518	F714, F713	-	-	-



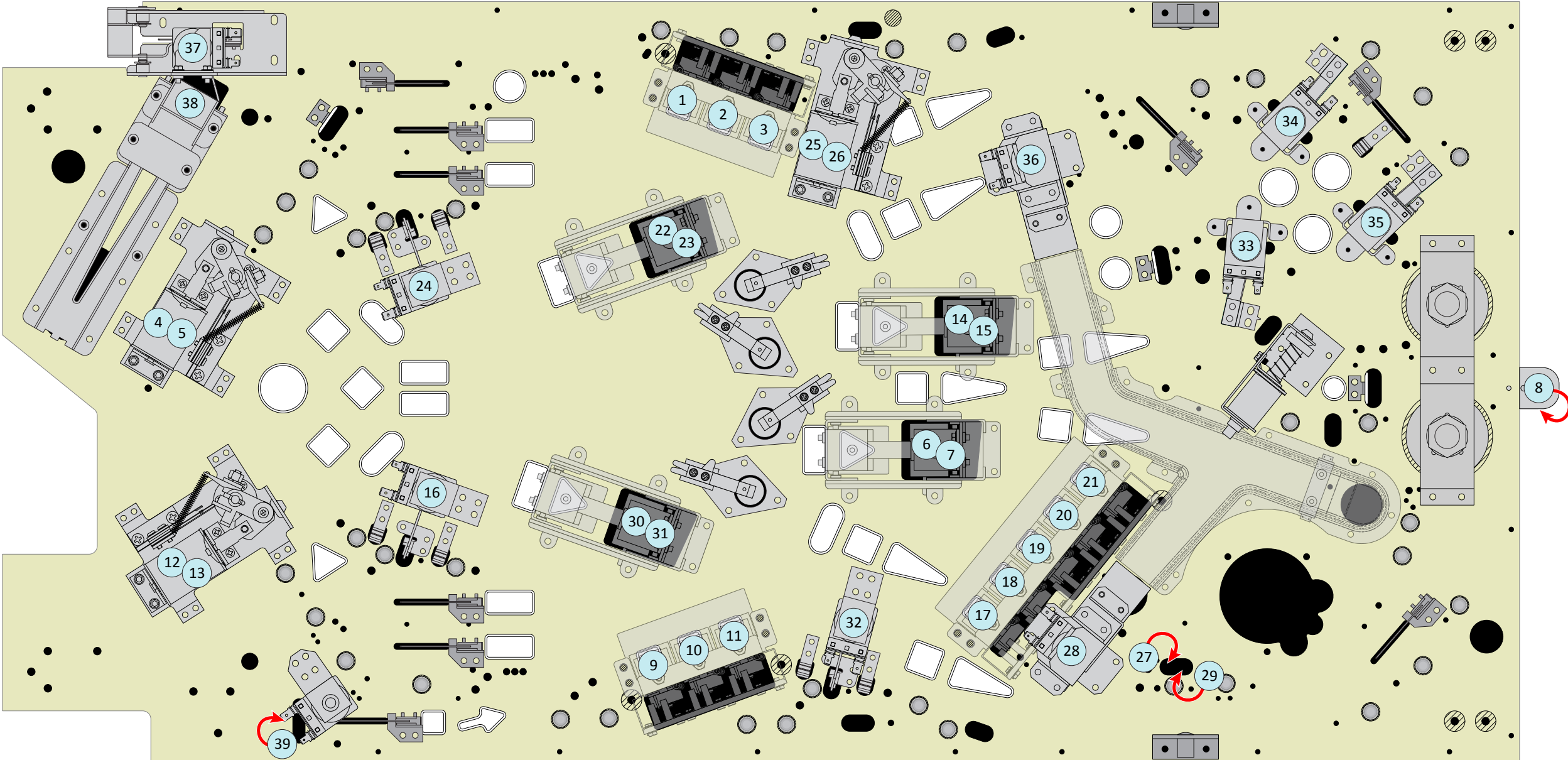
70-Volt Coil Locations

Above Playfield

Drive	Coil Function	Part Number	Part of Assembly	Drawing	Drive	Coil Function	Part Number	Part of Assembly	Drawing
1	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	32	Upper Slingshot	23-0010-00	51-0003-03	C-20
2	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	33	Left Pop Bumper	23-0010-00	51-0004-01	C-22
3	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	34	Right Pop Bumper	23-0010-00	51-0004-01	C-22
4	Right Flipper Power	23-2003-00	51-0001-00	C-18	35	Upper Pop Bumper	23-0010-00	51-0004-01	C-22
5	Right Flipper Hold	23-2003-00	51-0001-00	C-18	36	Radagast VUK	23-0003-00	51-0012-00	C-24
6	Goblin Pop-Up Power	23-2004-01	52-0044-02	C-50	37	Ball Auto-Launch	23-0003-00	51-0026-00	C-32
7	Goblin Pop-Up Hold	23-2004-01	52-0044-02	C-50	38	5-Ball Trough VUK	23-0010-00	51-0021-00	C-30
8	Ramp U-Turn Diverter	23-3007-00	51-5036-00	C-48	39	Windlance Shot/Kickback	23-0003-00	51-0025-00	C-31
9	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26	40	Knocker (in backbox)	23-0003-00	51-0032-01	C-35
10	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26					
11	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26					
12	Left Flipper Power	23-2003-00	51-0002-00	C-19					
13	Left Flipper Hold	23-2003-00	51-0002-00	C-19					
14	Orc Pop-Up Power	23-2004-01	52-0044-03	C-50					
15	Orc Pop-Up Hold	23-2004-01	52-0044-03	C-50					
16	Left Slingshot	23-0010-00	51-0003-01	C-20					
17	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
18	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
19	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
20	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
21	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
22	Warg Pop-Up Power	23-2004-01	52-0044-01	C-50					
23	Warg Pop-Up Hold	23-2004-01	52-0044-01	C-50					
24	Right Slingshot	23-0010-00	51-0003-02	C-20					
25	Upper Right Flipper Power	23-2003-00	51-0001-13	C-18					
26	Upper Right Flipper Hold	23-2003-00	51-0001-13	C-18					
27	Smaug Feed Diverter	23-3007-00	51-5035-00	C-48					
28	Balin VUK	23-0003-00	51-0012-01	C-25					
29	Ramp Hold Magnet	23-3014-00	51-5034-00	C-48					
30	Spider Pop-Up Power	23-2004-01	52-0044-00	C-50					
31	Spider Pop-Up Hold	23-2004-01	52-0044-00	C-50					



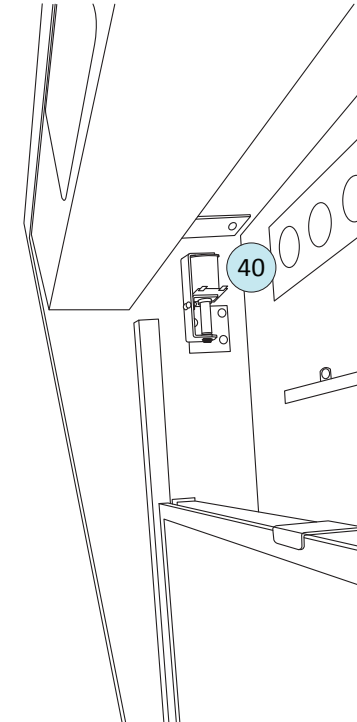
(70V coil wiring table on pg C-125)



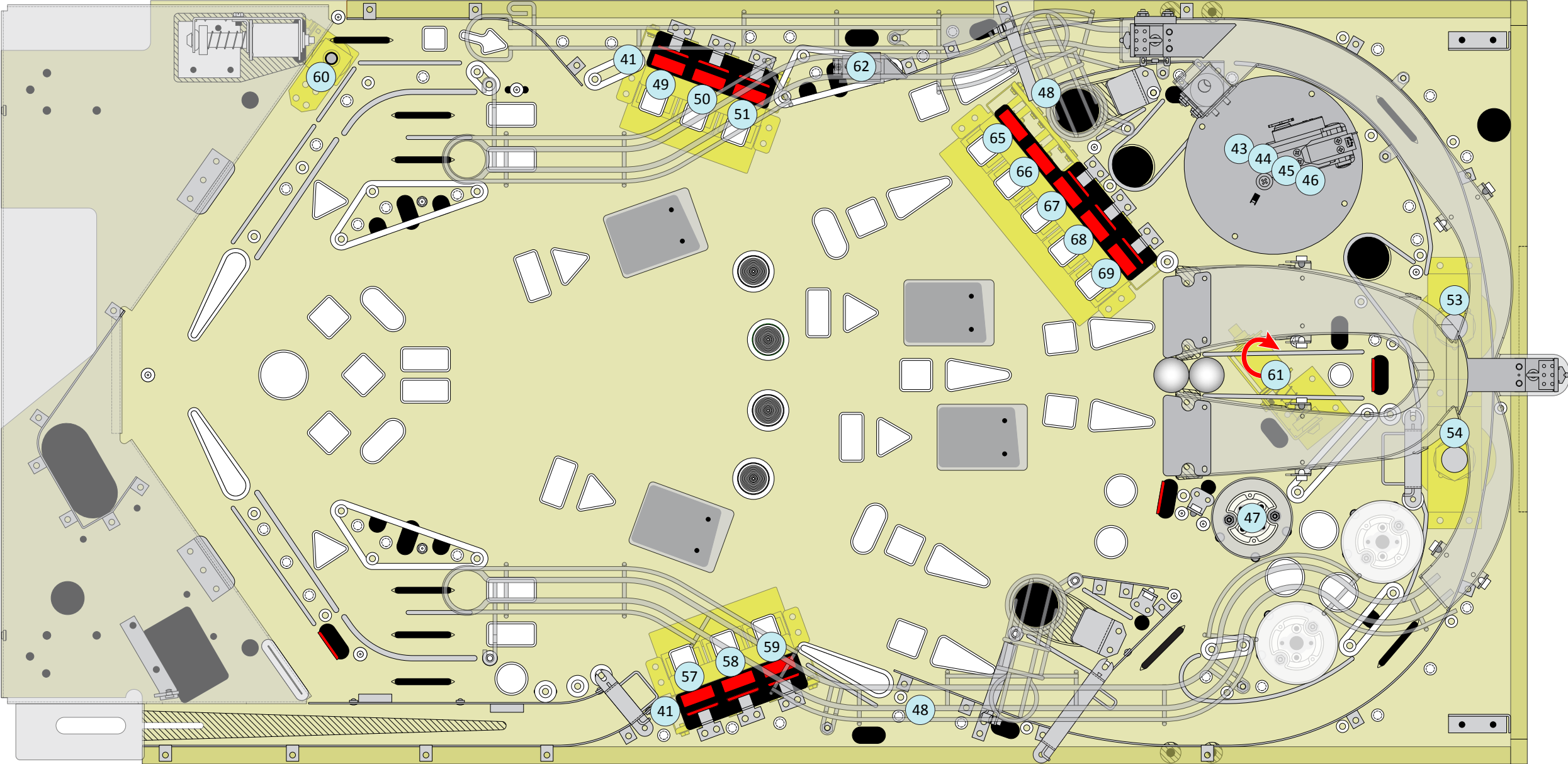
70-Volt Coil Locations

Under Playfield

Drive	Coil Function	Part Number	Part of Assembly	Drawing	Drive	Coil Function	Part Number	Part of Assembly	Drawing
1	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	32	Upper Slingshot	23-0010-00	51-0003-03	C-20
2	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	33	Left Pop Bumper	23-0010-00	51-0004-01	C-22
3	MAN Drop Target Reset (Up)	23-0010-00	51-0015-00	C-26	34	Right Pop Bumper	23-0010-00	51-0004-01	C-22
4	Right Flipper Power	23-2003-00	51-0001-00	C-18	35	Upper Pop Bumper	23-0010-00	51-0004-01	C-22
5	Right Flipper Hold	23-2003-00	51-0001-00	C-18	36	Radagast VUK	23-0003-00	51-0012-00	C-24
6	Goblin Pop-Up Power	23-2004-01	52-0044-02	C-50	37	Ball Auto-Launch	23-0003-00	51-0026-00	C-32
7	Goblin Pop-Up Hold	23-2004-01	52-0044-02	C-50	38	5-Ball Trough VUK	23-0010-00	51-0021-00	C-30
8	Ramp U-Turn Diverter	23-3007-00	51-5036-00	C-48	39	Windlance Shot/Kickback	23-0003-00	51-0025-00	C-31
9	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26	40	Knocker (in backbox)	23-0003-00	51-0032-01	C-35
10	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26					
11	ELF Drop Target Reset (Up)	23-0010-00	51-0015-01	C-26					
12	Left Flipper Power	23-2003-00	51-0002-00	C-19					
13	Left Flipper Hold	23-2003-00	51-0002-00	C-19					
14	Orc Pop-Up Power	23-2004-01	52-0044-03	C-50					
15	Orc Pop-Up Hold	23-2004-01	52-0044-03	C-50					
16	Left Slingshot	23-0010-00	51-0003-01	C-20					
17	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
18	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
19	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
20	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
21	DWARF Drop Target Reset (Up)	23-0010-00	51-0017-00	C-28					
22	Warg Pop-Up Power	23-2004-01	52-0044-01	C-50					
23	Warg Pop-Up Hold	23-2004-01	52-0044-01	C-50					
24	Right Slingshot	23-0010-00	51-0003-02	C-20					
25	Upper Right Flipper Power	23-2003-00	51-0001-13	C-18					
26	Upper Right Flipper Hold	23-2003-00	51-0001-13	C-18					
27	Smaug Feed Diverter	23-3007-00	51-5035-00	C-48					
28	Balin VUK	23-0003-00	51-0012-01	C-25					
29	Ramp Hold Magnet	23-3014-00	51-5034-00	C-48					
30	Spider Pop-Up Power	23-2004-01	52-0044-00	C-50					
31	Spider Pop-Up Hold	23-2004-01	52-0044-00	C-50					



(70V coil wiring table on pg C-125)



20-Volt Coil Locations

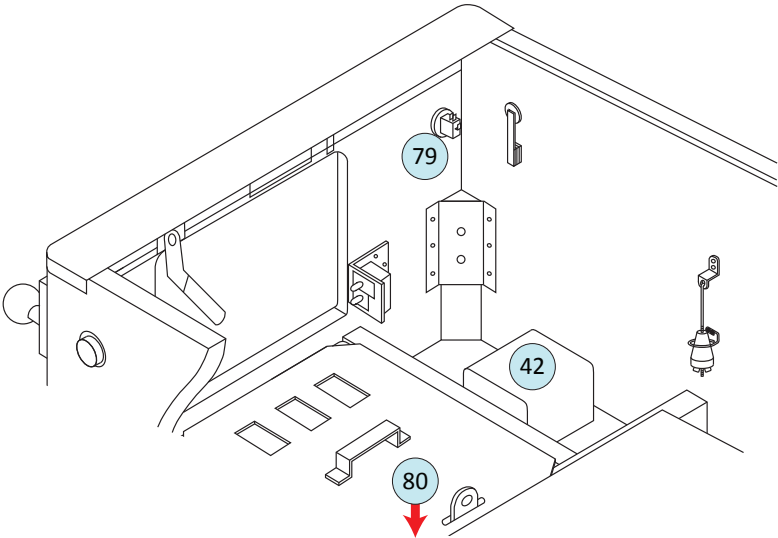
Above Playfield

Drive	Function	Part Number	Part of Assembly	Drawing
49	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
50	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
51	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
53	Top Magnet, Left	23-4005-00	51-0046-00	C-36
54	Top Magnet, Right	23-4005-00	51-0046-00	C-36
57	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
58	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
59	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
60	Windlance Up Post	23-0010-00	51-0030-00	C-33
61	Subway Diverter	23-0010-00	51-0048-00	C-36
62	Windlance Diverter	23-3015-00	51-5038-00	C-13
65	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
66	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
67	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
68	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
69	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28

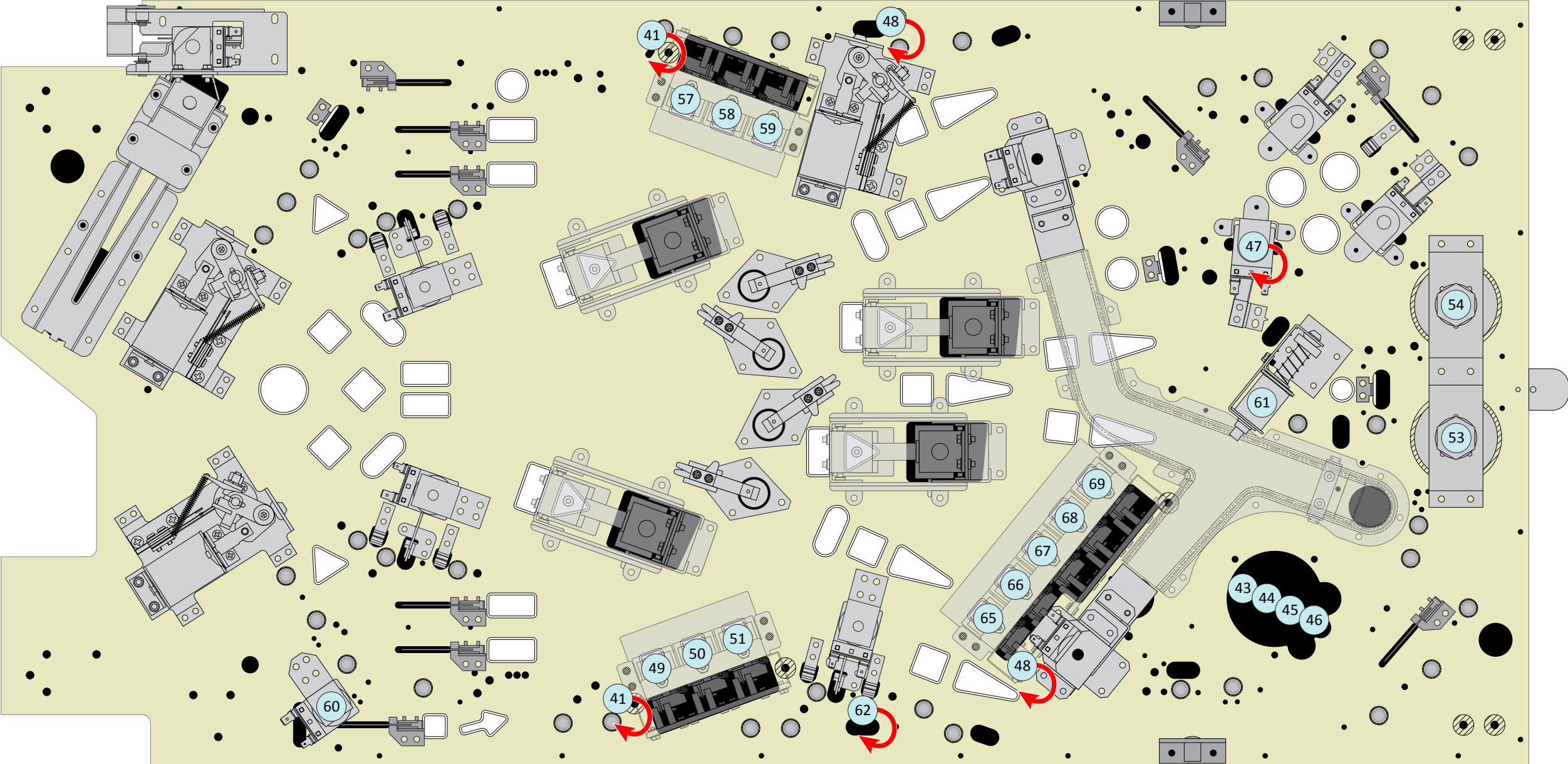
12-Volt Motor & Light Locations

Above Playfield

Drive	Function	Part Number	Part of Assembly	Drawing
41	Spotlights, Lower	24-0017-00	30-0047-00	-
42	Shaker Motor	23-5003-00	51-5027-01	C-41
43	Smaug Stepper Motor 1	23-5007-00	52-0038-00	C-46
44	Smaug Stepper Motor 2	23-5007-00	52-0038-00	C-46
45	Smaug Stepper Motor 3	23-5007-00	52-0038-00	C-46
46	Smaug Stepper Motor 4	23-5007-00	52-0038-00	C-46
47	Left Pop Bumper Light	24-0006-13	51-0006-09	C-23
48	Spotlights, Upper	24-0017-00	30-0047-01	-
79	Start Button Light	24-0017-00	18-7023-04	-
80	Redemption Ticket Motor (under cabinet)	-	-	-



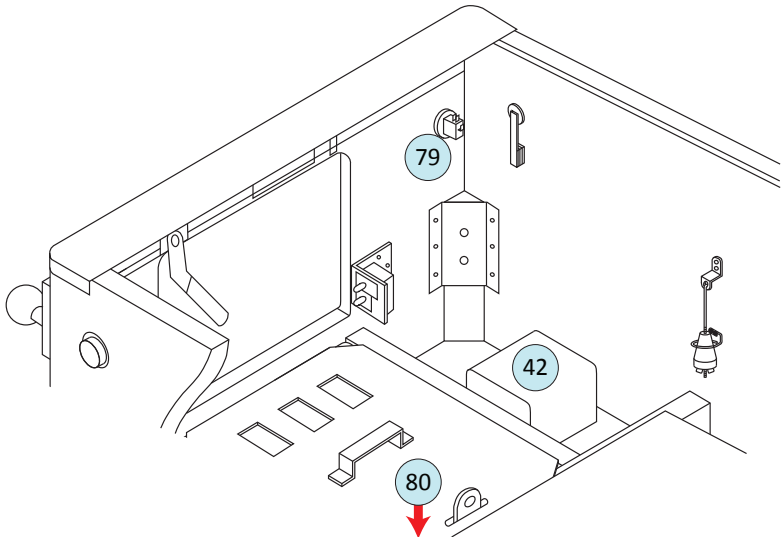
(20V/12V device wiring tables on pg C-126)



20-Volt Coil Locations

Under Playfield

Drive	Function	Part Number	Part of Assembly	Drawing
49	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
50	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
51	ELF Drop Target Retract (Down)	23-3015-00	51-0015-01	C-26
53	Top Magnet, Left	23-4005-00	51-0046-00	C-36
54	Top Magnet, Right	23-4005-00	51-0046-00	C-36
57	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
58	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
59	MAN Drop Target Retract (Down)	23-3015-00	51-0015-00	C-26
60	Windlance Up Post	23-0010-00	51-0030-00	C-33
61	Subway Diverter	23-0010-00	51-0048-00	C-36
62	Windlance Diverter	23-3015-00	51-5038-00	C-13
65	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
66	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
67	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
68	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28
69	DWARF Drop Target Retract (Down)	23-3015-00	51-0017-00	C-28

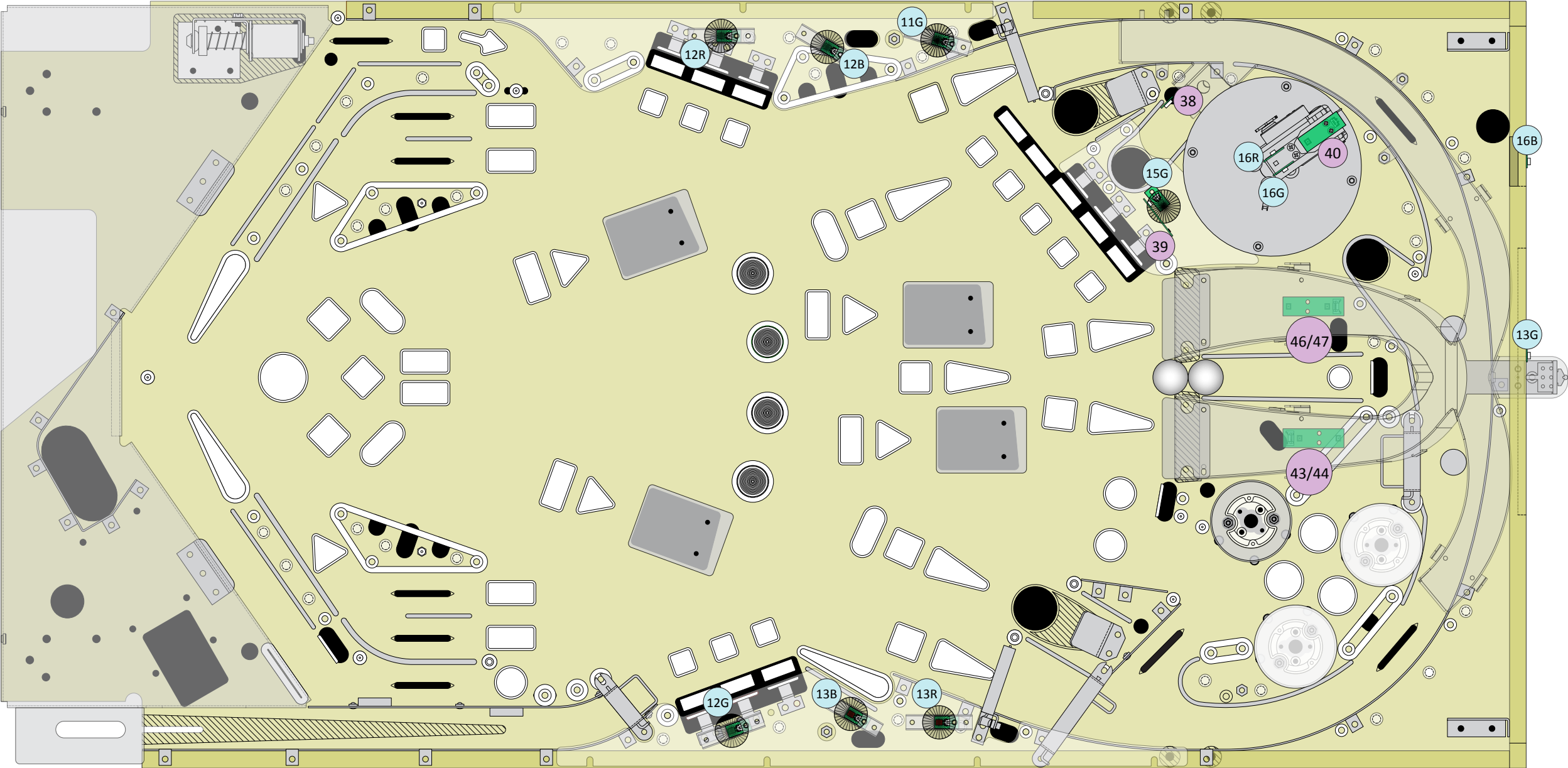


12-Volt Motor & Light Locations

Under Playfield

Drive	Function	Part Number	Part of Assembly	Drawing
41	Spotlights, Lower	24-0017-00	30-0047-00	-
42	Shaker Motor	23-5003-00	51-5027-01	C-41
43	Smaug Stepper Motor 1	23-5007-00	52-0038-00	C-46
44	Smaug Stepper Motor 2	23-5007-00	52-0038-00	C-46
45	Smaug Stepper Motor 3	23-5007-00	52-0038-00	C-46
46	Smaug Stepper Motor 4	23-5007-00	52-0038-00	C-46
47	Left Pop Bumper Light	24-0006-13	51-0006-09	C-23
48	Spotlights, Upper	24-0017-00	30-0047-01	-
79	Start Button Light	24-0017-00	18-7023-04	-
80	Redemption Ticket Motor (under cabinet)	-	-	-




(20V/12V device wiring tables on pg C-126)

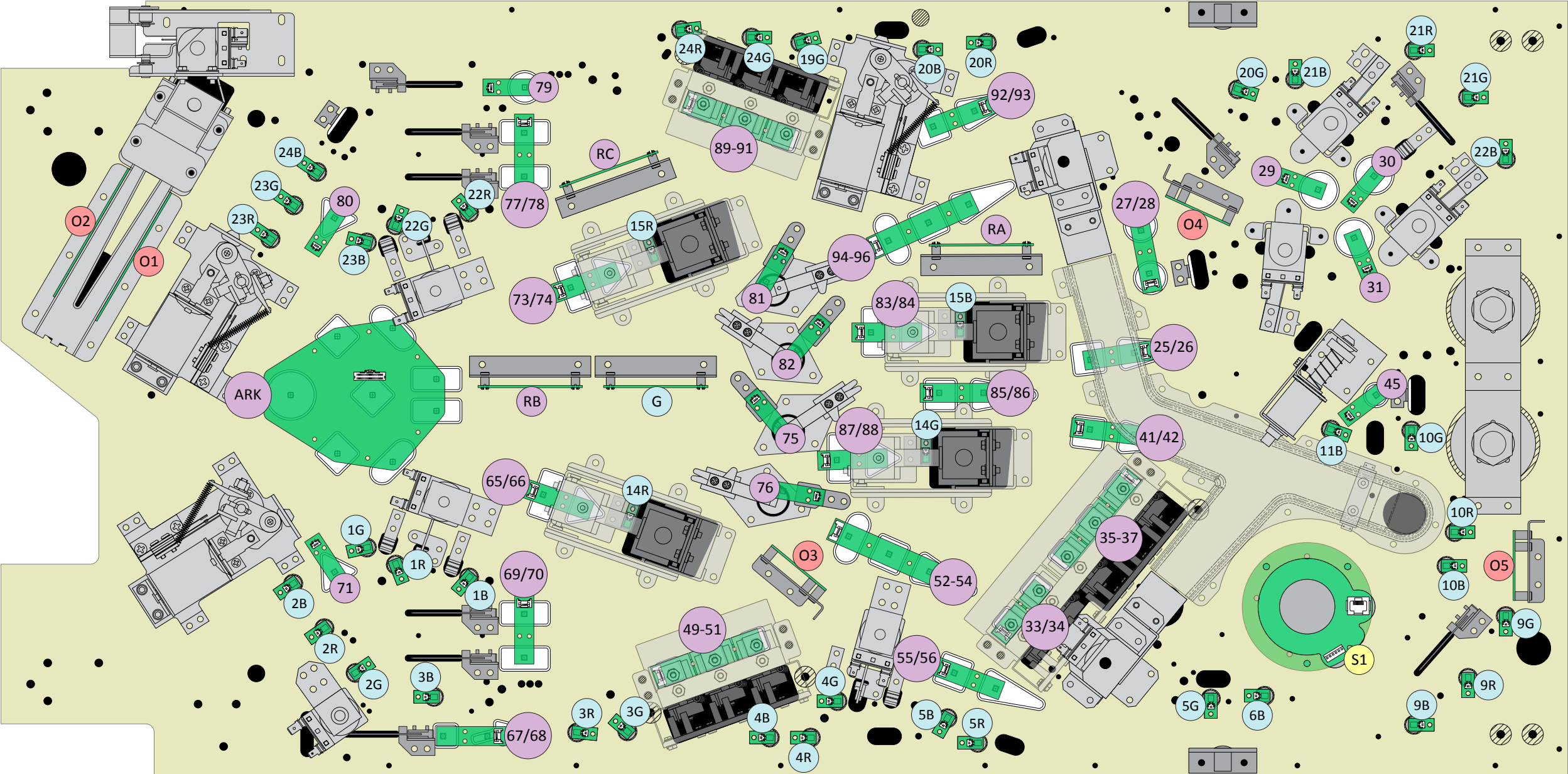


Color Key: ● GI/Flasher Boards ● RGB LED Boards

Playfield Printed Circuit Boards

Above Playfield












Item Number	Color Key	PCB Type	Part Number	Function	Details
11 to 13, 15, 16 (R, G, B)		GI LED Board	15-0027-00	General illumination/flasher	D-12
38 to 40		RGB LED Single Board	15-0028-0X	Feature lighting	D-16
43/44, 46/47		RGB LED Double Board	15-0029-0X	Feature lighting	D-20

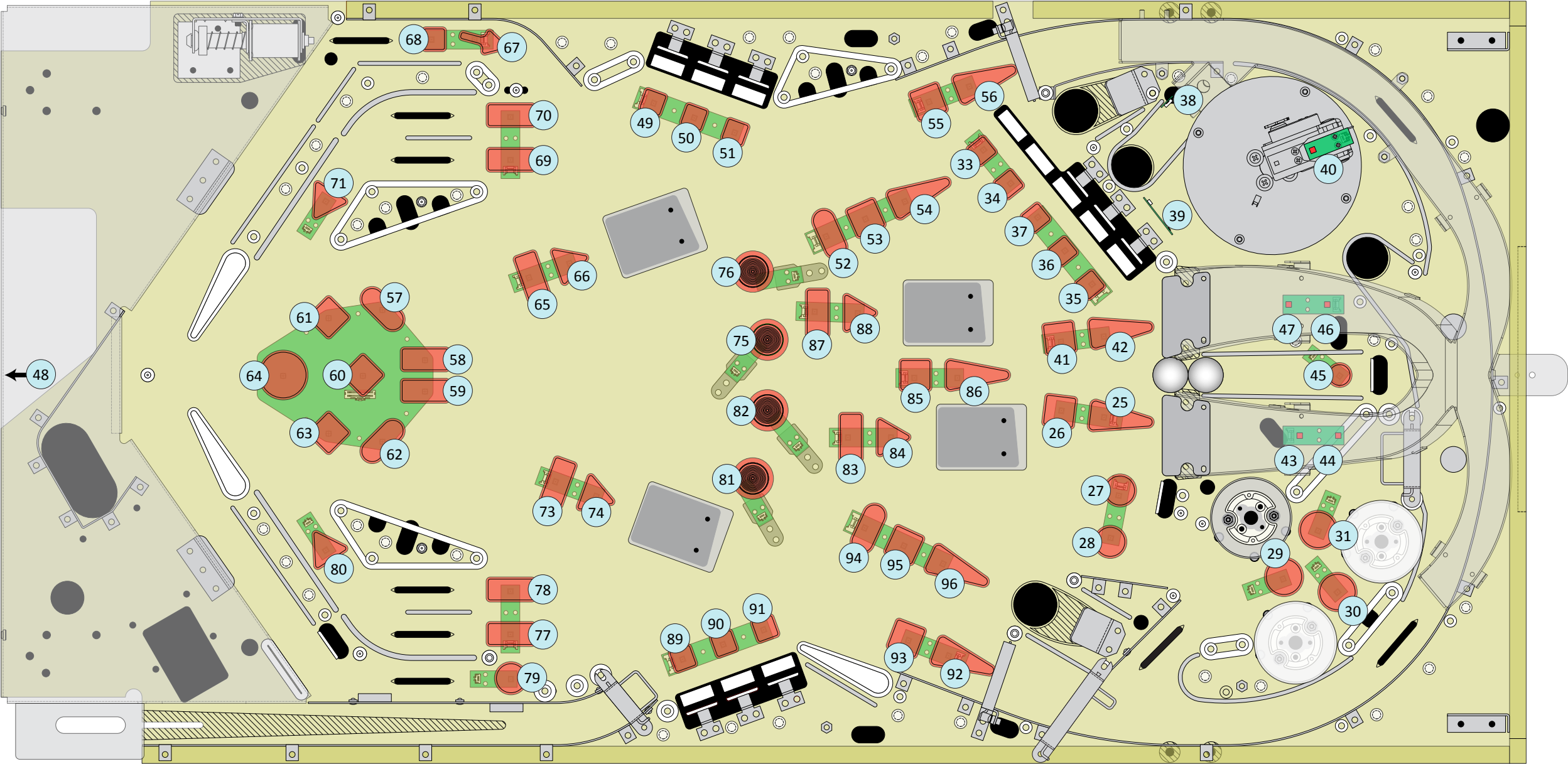


Color Key: ● GI Boards ● RGB LED Boards ● Opto Boards ● Other Boards

Playfield Printed Circuit Boards







































































Under Playfield

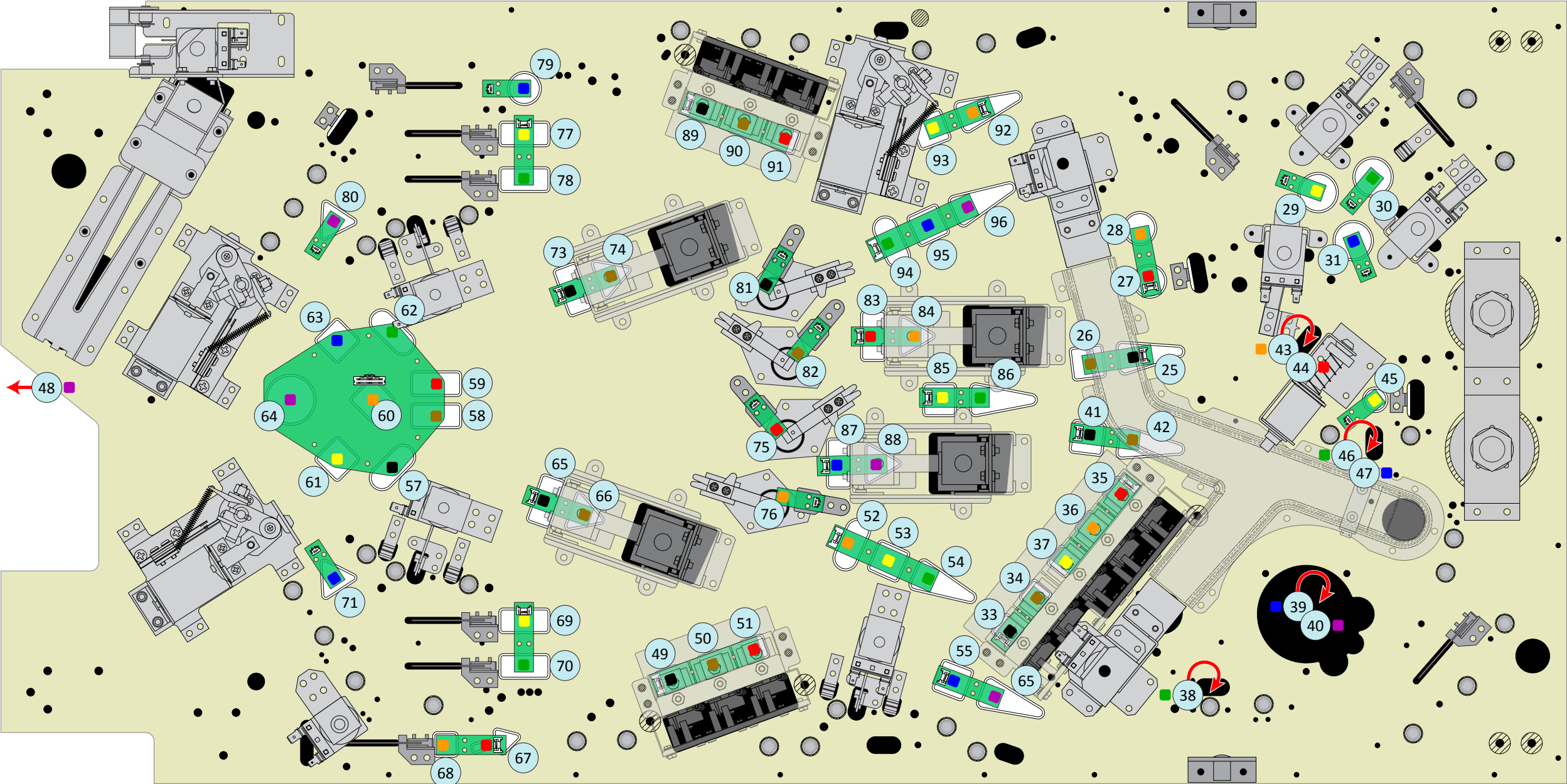
Item Number	Color Key	PCB Type	Part Number	Function	Details
1 to 6, 9 to 15, 19 to 24 (R, G & B)		GI LED Board	15-0027-0X	General illumination/accent lighting	D-12
29 to 31, 45, 71, 75, 76, 79 to 82		RGB LED Single Board	15-0028-0X	Feature lighting	D-16 or D-18
25/26, 27/28, 33/34, 41/42, 55/56, 67/68, 65/66, 69/70, 73/74, 77/78, 83/84, 85/86, 87/88, 92/93		RGB LED Double Board	15-0029-0X	Feature lighting	D-20 or D-22
49-51, 89-91, 94-96, 52-54, 35-36		RGB LED Triple Board	15-0030-0X	Feature lighting	D-24 or D-26
ARK		Hobbit Arkenstone RGB LED Board	15-0032-0X	Feature lighting	D-28 or D-31
RA, RB, RC		RGB LED Controller PCB Assy	15-4031-0X	Feature lighting control	D-34 or D-45
G		BAG Controller PCB Assy	15-4033-0X	General illumination/flasher control	D-56 or D-64
O1		5-Ball Trough Opto Receiver Board	15-0004-00	5-ball trough opto switch receivers	D-2
O2		5-Ball Trough Opto Transmitter Board	15-0004-01	5-ball trough opto switch transmitters	D-5
O3, O4, O5		Opto I/O Board	15-0007-00	Playfield opto switch I/O	D-7
S1		Hobbit Smaug Controller Board	15-0035-00	Smaug sculpture/assembly control	D-72



Playfield Feature Lighting (RGB LEDs)







































































Above Playfield

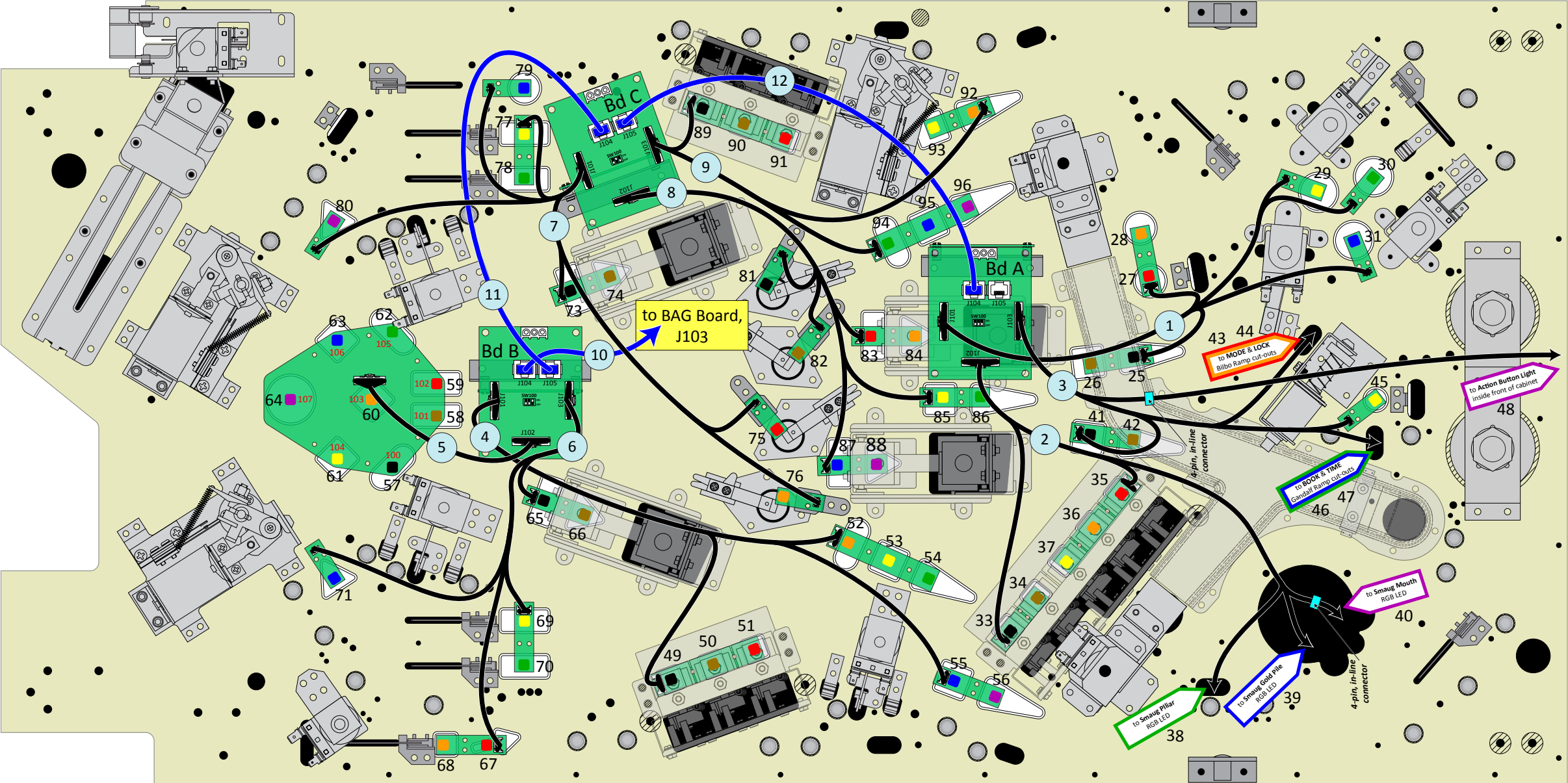
RGB#	Location/Function	RGB Bd, Connector	RGB#	Location/Function	RGB Bd, Connector	RGB#	Location/Function	RGB Bd, Connector
25	 Bilbo Arrow	Bd A, J101	50	 Oin	Bd B, J101	75	 LOCK Rollover	Bd C, J101
26	 Bilbo Parchment	Bd A, J101	51	 Dwalin	Bd B, J101	76	 LOCK Rollover	Bd C, J101
27	 Mystery	Bd A, J101	52	 EXTRA BALL	Bd B, J101	77	 Return Lane Spider	Bd C, J101
28	 Bag End	Bd A, J101	53	 Balin Parchment	Bd B, J101	78	 Return Lane Goblin	Bd C, J101
29	 Pop Bumpers, Lower	Bd A, J101	54	 Balin Arrow	Bd B, J101	79	 Preciousssss	Bd C, J101
30	 Pop Bumpers, Right	Bd A, J101	55	 Fili Parchment	Bd B, J101	80	 Light Mystery, Right	Bd C, J101
31	 Pop Bumpers, Left	Bd A, J101	56	 Fili Arrow	Bd B, J101	81	 LOCK Rollover	Bd C, J102
33	 Balin, Left	Bd A, J102	57	 Shoot Again	Bd B, J102	82	 LOCK Rollover	Bd C, J102
34	 Balin, Right	Bd A, J102	58	 Lock 1	Bd B, J102	83	 Orc Pop-Up Parchment	Bd C, J102
35	 Bombur	Bd A, J102	59	 Lock 2	Bd B, J102	84	 Orc Pop-Up Arrow	Bd C, J102
36	 Bofur	Bd A, J102	60	 Barrel Escape	Bd B, J102	85	 Thorin Parchment	Bd C, J102
37	 Bifur	Bd A, J102	61	 Into The Fire	Bd B, J102	86	 Thorin Arrow	Bd C, J102
38	 Smaug Pillar	Bd A, J102	62	 Super X	Bd B, J102	87	 Goblin Pop-Up Parchment	Bd C, J102
39	 Smaug Gold Pile	Bd A, J102	63	 Battle Of Five Armies	Bd B, J102	88	 Goblin Pop-Up Arrow	Bd C, J102
40	 Smaug Mouth	Bd A, J102	64	 Arkenstone	Bd B, J102	89	 Ori	Bd C, J103
41	 Gandalf Parchment	Bd A, J103	65	 Spider Pop-Up Parchment	Bd B, J103	90	 Dori	Bd C, J103
42	 Gandalf Arrow	Bd A, J103	66	 Spider Pop-Up Arrow	Bd B, J103	91	 Nori	Bd C, J103
43	 Bilbo Ramp MODE Cut-out	Bd A, J103	67	 Kickback	Bd B, J103	92	 Kili Arrow	Bd C, J103
44	 Bilbo Ramp LOCK Cut-out	Bd A, J103	68	 Load Arrow	Bd B, J103	93	 Kili Parchment	Bd C, J103
45	 Key	Bd A, J103	69	 Return Lane Orc	Bd B, J103	94	 EXTRA BALL	Bd C, J103
46	 Gandalf Ramp BOOK Cut-out	Bd A, J103	70	 Return Lane Warg	Bd B, J103	95	 Radagast Parchment	Bd C, J103
47	 Gandalf Ramp TIME Cut-out	Bd A, J103	71	 Light Mystery, Left	Bd B, J103	96	 Radagast Arrow	Bd C, J103
48	 Ring Button Light (inside cab front)	Bd A, J103	73	 Warg Pop-Up Parchment	Bd C, J101			
49	 Gloin	Bd B, J101	74	 Warg Pop-Up Arrow	Bd C, J101			



Playfield Feature Lighting (RGB LEDs)

Under Playfield

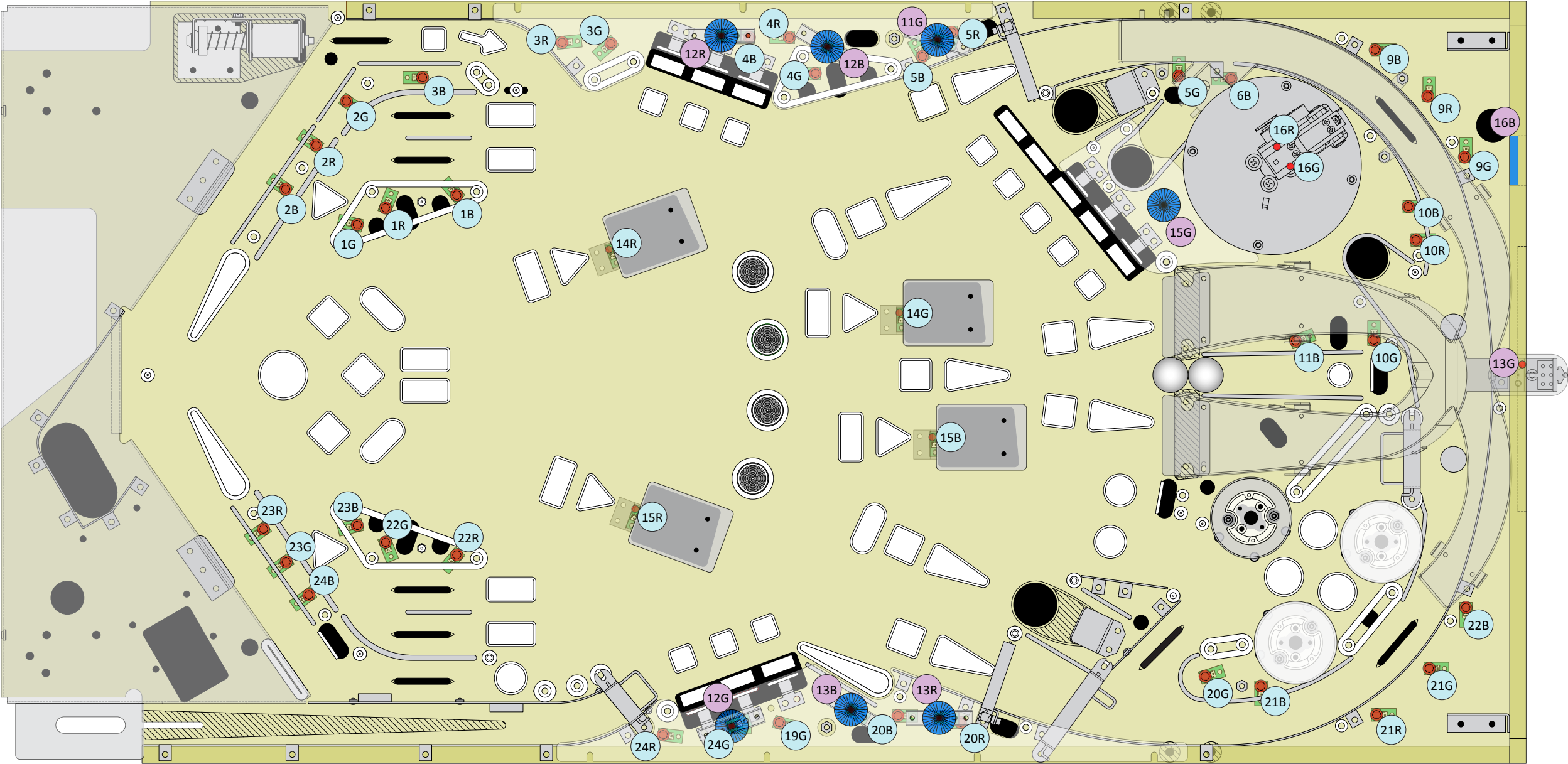
RGB#	Location/Function	RGB Bd, Connector	RGB#	Location/Function	RGB Bd, Connector	RGB#	Location/Function	RGB Bd, Connector
25	 Bilbo Arrow	Bd A, J101	50	 Oin	Bd B, J101	75	 LOCK Rollover	Bd C, J101
26	 Bilbo Parchment	Bd A, J101	51	 Dwalin	Bd B, J101	76	 LOCK Rollover	Bd C, J101
27	 Mystery	Bd A, J101	52	 EXTRA BALL	Bd B, J101	77	 Return Lane Spider	Bd C, J101
28	 Bag End	Bd A, J101	53	 Balin Parchment	Bd B, J101	78	 Return Lane Goblin	Bd C, J101
29	 Pop Bumpers, Lower	Bd A, J101	54	 Balin Arrow	Bd B, J101	79	 Preciousssss	Bd C, J101
30	 Pop Bumpers, Right	Bd A, J101	55	 Fili Parchment	Bd B, J101	80	 Light Mystery, Right	Bd C, J101
31	 Pop Bumpers, Left	Bd A, J101	56	 Fili Arrow	Bd B, J101	81	 LOCK Rollover	Bd C, J102
33	 Balin, Left	Bd A, J102	57	 Shoot Again	Bd B, J102	82	 LOCK Rollover	Bd C, J102
34	 Balin, Right	Bd A, J102	58	 Lock 1	Bd B, J102	83	 Orc Pop-Up Parchment	Bd C, J102
35	 Bombur	Bd A, J102	59	 Lock 2	Bd B, J102	84	 Orc Pop-Up Arrow	Bd C, J102
36	 Bofur	Bd A, J102	60	 Barrel Escape	Bd B, J102	85	 Thorin Parchment	Bd C, J102
37	 Bifur	Bd A, J102	61	 Into The Fire	Bd B, J102	86	 Thorin Arrow	Bd C, J102
38	 Smaug Pillar	Bd A, J102	62	 Super X	Bd B, J102	87	 Goblin Pop-Up Parchment	Bd C, J102
39	 Smaug Gold Pile	Bd A, J102	63	 Battle Of Five Armies	Bd B, J102	88	 Goblin Pop-Up Arrow	Bd C, J102
40	 Smaug Mouth	Bd A, J102	64	 Arkenstone	Bd B, J102	89	 Ori	Bd C, J103
41	 Gandalf Parchment	Bd A, J103	65	 Spider Pop-Up Parchment	Bd B, J103	90	 Dori	Bd C, J103
42	 Gandalf Arrow	Bd A, J103	66	 Spider Pop-Up Arrow	Bd B, J103	91	 Nori	Bd C, J103
43	 Bilbo Ramp MODE Cut-out	Bd A, J103	67	 Kickback	Bd B, J103	92	 Kili Arrow	Bd C, J103
44	 Bilbo Ramp LOCK Cut-out	Bd A, J103	68	 Load Arrow	Bd B, J103	93	 Kili Parchment	Bd C, J103
45	 Key	Bd A, J103	69	 Return Lane Orc	Bd B, J103	94	 EXTRA BALL	Bd C, J103
46	 Gandalf Ramp BOOK Cut-out	Bd A, J103	70	 Return Lane Warg	Bd B, J103	95	 Radagast Parchment	Bd C, J103
47	 Gandalf Ramp TIME Cut-out	Bd A, J103	71	 Light Mystery, Left	Bd B, J103	96	 Radagast Arrow	Bd C, J103
48	 Ring Button Light (inside cab front)	Bd A, J103	73	 Warg Pop-Up Parchment	Bd C, J101			
49	 Gloin	Bd B, J101	74	 Warg Pop-Up Arrow	Bd C, J101			



RGB LED Feature Lighting Wiring




























Under Playfield




























Cable	Description	Part Number	RGB Bd(s), Connector(s)	Details
1	Hobbit Upper Right RGB Cable, 1mm	19-3095-01	Bd A, J101	D-34, D-36
or	Hobbit Upper Right RGB Cable, 2.5mm	19-3095-11		D-45, D-47
2	Hobbit Upper Left RGB Cable, 1mm	19-3095-02	Bd A, J102	D-34, D-37
or	Hobbit Upper Left RGB Cable, 2.5mm	19-3095-12		D-45, D-48
3	Hobbit Upper Middle RGB Cable, 1mm	19-3095-03	Bd A, J103	D-34, D-38
or	Hobbit Upper Middle RGB Cable, 2.5mm	19-3095-13		D-45, D-49
4	Hobbit Middle Left RGB Cable, 1mm	19-3095-04	Bd B, J101	D-34, D-39
or	Hobbit Middle Left RGB Cable, 2.5mm	19-3095-14		D-45, D-50
5	Hobbit Lower Middle RGB Cable, 1mm	19-3095-05	Bd B, J102	D-34, D-40
or	Hobbit Lower Middle RGB Cable, 2.5mm	19-3095-15		D-45, D-51
6	Hobbit Lower Left RGB Cable, 1mm	19-3095-06	Bd B, J103	D-34, D-41
or	Hobbit Lower Left RGB Cable, 2.5mm	19-3095-16		D-45, D-52
7	Hobbit Lower Right RGB Cable, 1mm	19-3095-07	Bd C, J101	D-34, D-42
or	Hobbit Lower Right RGB Cable, 2.5mm	19-3095-17		D-45, D-53
8	Hobbit Middle RGB Cable, 1mm	19-3095-08	Bd C, J102	D-34, D-43
or	Hobbit Middle RGB Cable, 2.5mm	19-3095-18		D-45, D-54
9	Hobbit Middle Right RGB Cable	19-3095-09	Bd C, J103	D-34, D-44
or	Hobbit Middle Right RGB Cable, 2.5mm	19-3095-19		D-45, D-55
10	Ethernet Cable, Cat5E, Shielded, 2ft	19-3111-02	Bd B, J104	D-34, D-41
11	Ethernet Cable, Cat5E, Shielded, 2ft	19-3111-02	Bd B, J105 - Bd C, J104	D-34, D-41
12	Ethernet Cable, Cat5E, Shielded, 3ft	19-3111-03	Bd C, J105 - Bd A, J104	D-34, D-44

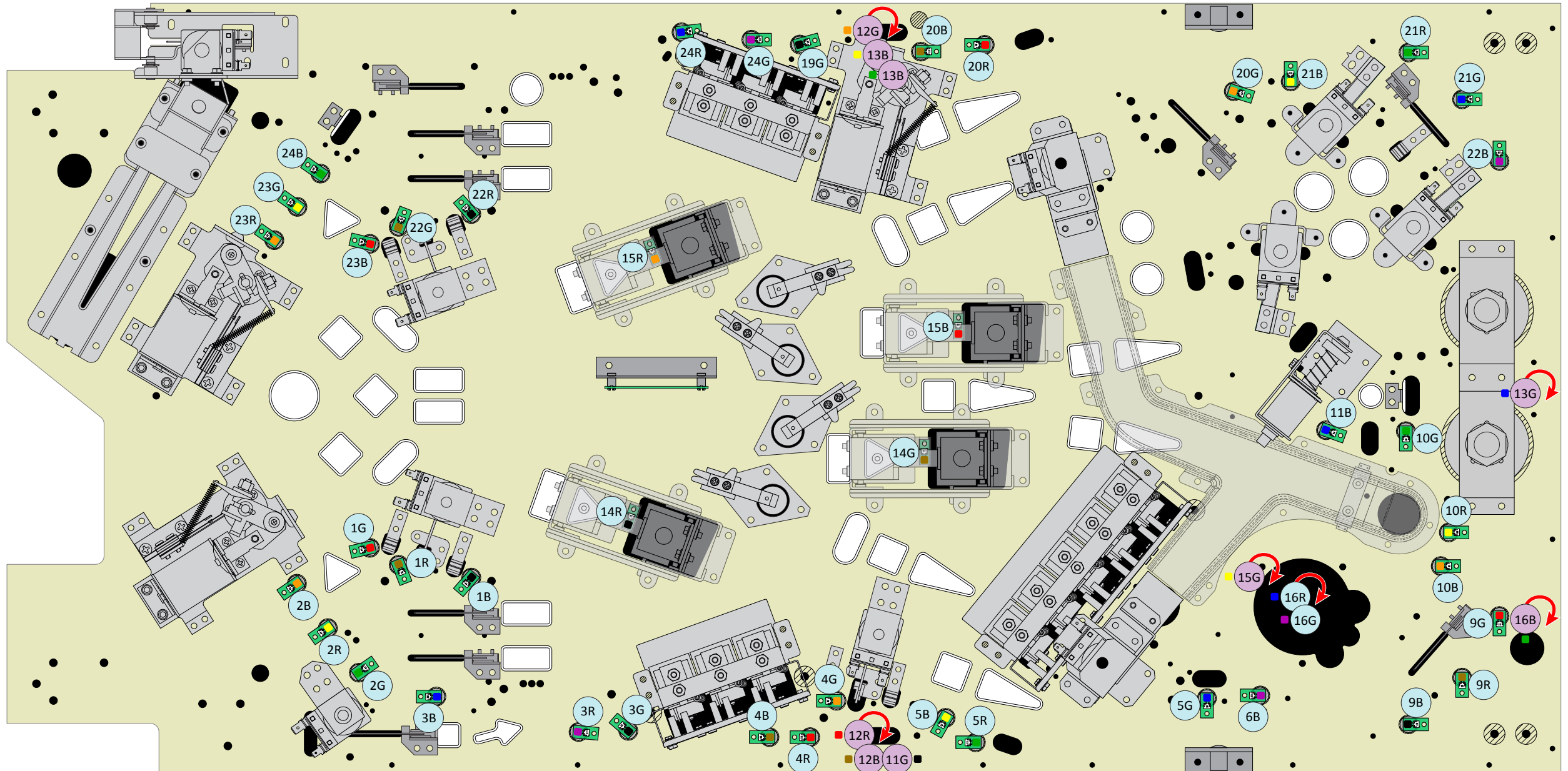


Playfield GI Lighting & Flashers (LEDs)

Above Playfield




























LED#	Location/Function	BAG Bd Connector	Details 1mm/2.5mm
1R	 Left Sling #2	J105	D-56, D-61/D-64, D-69
1G	 Left Sling #3 (Low)	J105	D-56, D-61/D-64, D-69
1B	 Left Sling #1 (High)	J105	D-56, D-61/D-64, D-69
2R	 Left Return #3	J105	D-56, D-61/D-64, D-69
2G	 Left Return #2	J105	D-56, D-61/D-64, D-69
2B	 Left Return #4 (Low)	J105	D-56, D-61/D-64, D-69
3R	 Left Side #7 (Low)	J105	D-56, D-61/D-64, D-69
3G	 Left Side #6	J106	D-56, D-61/D-64, D-69
3B	 Left Return #1 (High)	J105	D-56, D-61/D-64, D-69
4R	 Left Side #4	J106	D-56, D-61/D-64, D-69
4G	 Left Side #3	J106	D-56, D-61/D-64, D-69
4B	 Left Side #5	J106	D-56, D-61/D-64, D-69
5R	 Left Side #1 (High)	J106	D-56, D-61/D-64, D-69
5G	 Smaug Area #4 (Low)	J106	D-56, D-61/D-64, D-69
5B	 Left Side #2	J106	D-56, D-61/D-64, D-69
6B	 Smaug Area #3	J106	D-56, D-61/D-64, D-69
9R	 Upper Left Corner #2	J108	D-56, D-61/D-64, D-69
9G	 Upper Left Corner #1 (High)	J108	D-56, D-61/D-64, D-69
9B	 Upper Left Corner #3 (Low)	J108	D-56, D-61/D-64, D-69
10R	 Smaug Area #1 (High)	J108	D-56, D-61/D-64, D-69
10G	 Captive Ball Target #1 (High)	J108	D-56, D-61/D-64, D-69
10B	 Smaug Area #2	J108	D-56, D-61/D-64, D-69
11G	 Left Upper Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
11B	 Captive Ball Target #2 (Low)	J108	D-56, D-61/D-64, D-69
12R	 Left Lower Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
12G	 Right Lower Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
12B	 Left Middle Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70




























LED#	Location/Function	BAG Bd Connector	Details 1mm/2.5mm
13R	 Right Upper Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
13G	 Ramp U-Turn Flasher (above steel ramp)	J109	D-56, D-62/D-64, D-70
13B	 Right Middle Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
14R	 Spider Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
14G	 Goblin Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
15R	 Warg Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
15G	 Smaug Gold Pile Flasher (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
15B	 Orc Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
16R	 Smaug Left Eye (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
16G	 Smaug Right Eye (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
16B	 Back Panel Insert Flasher	J110	D-56, D-62/D-64, D-70
19G	 Right Side #3	J112	D-56, D-62/D-64, D-70
20R	 Right Side #1 (High)	J112	D-56, D-62/D-64, D-70
20G	 Right Pop Bumper #2 (Low)	J112	D-56, D-62/D-64, D-70
20B	 Right Side #2	J112	D-56, D-62/D-64, D-70
21R	 Upper Right Corner #3 (Low)	J112	D-56, D-62/D-64, D-70
21G	 Upper Right Corner #2	J112	D-56, D-62/D-64, D-70
21B	 Right Pop Bumper #1 (High)	J112	D-56, D-62/D-64, D-70
22R	 Right Sling #1 (High)	J113	D-56, D-63/D-64, D-71
22G	 Right Sling #2	J113	D-56, D-63/D-64, D-71
22B	 Upper Right Corner #1 (High)	J112	D-56, D-62/D-64, D-70
23R	 Right Return #3 (Low)	J113	D-56, D-63/D-64, D-71
23G	 Right Return #2	J113	D-56, D-63/D-64, D-71
23B	 Right Sling #3 (Low)	J113	D-56, D-63/D-64, D-71
24R	 Right Side #5 (Low)	J113	D-56, D-63/D-64, D-71
24G	 Right Side #4	J113	D-56, D-63/D-64, D-71
24B	 Right Return #1 (High)	J113	D-56, D-63/D-64, D-71

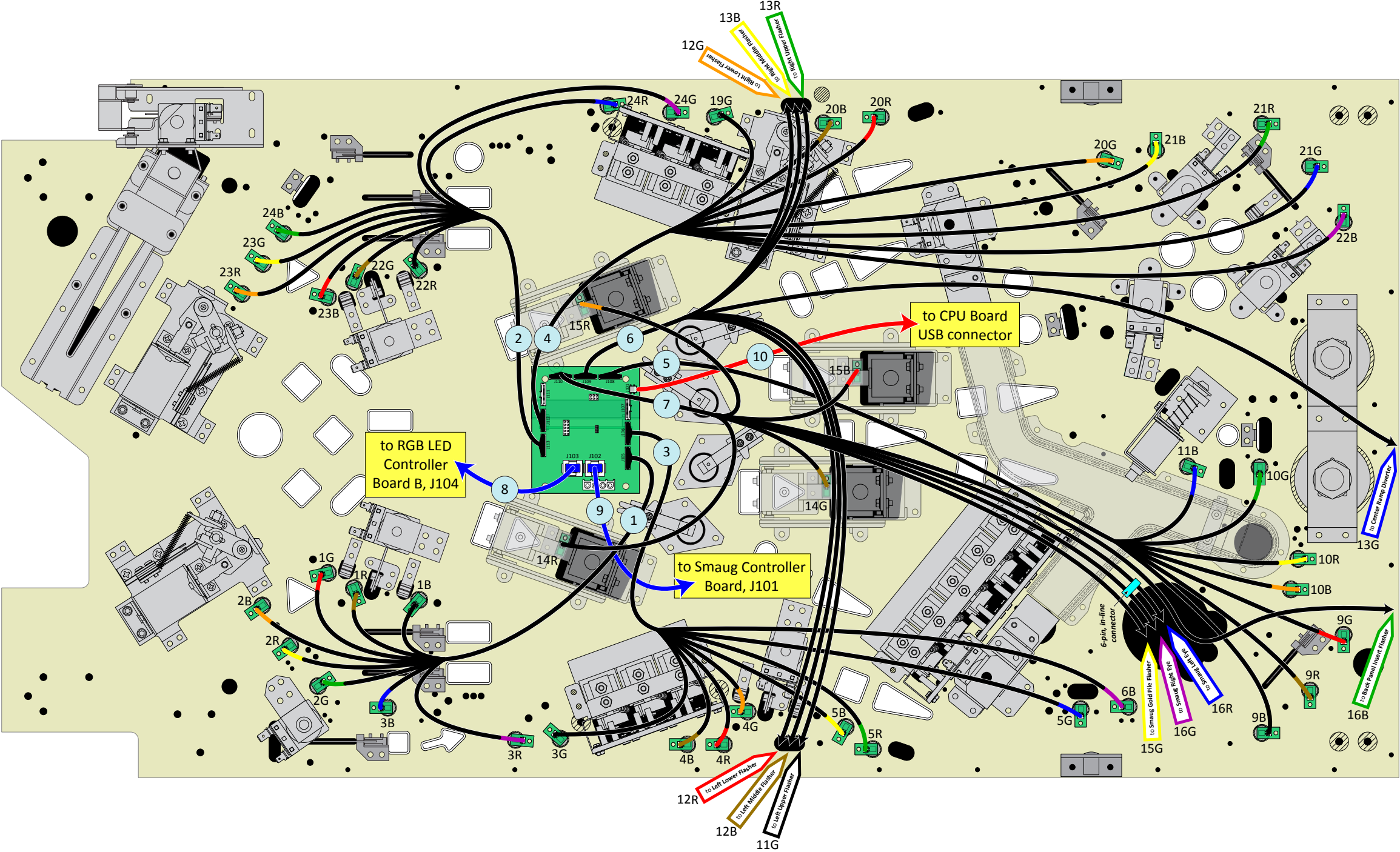


Playfield GI Lighting & Flashers (LEDs)

Under Playfield

LED#	Location/Function	BAG Bd Connector	Details 1mm/2.5mm
1R	 Left Sling #2	J105	D-56, D-61/D-64, D-69
1G	 Left Sling #3 (Low)	J105	D-56, D-61/D-64, D-69
1B	 Left Sling #1 (High)	J105	D-56, D-61/D-64, D-69
2R	 Left Return #3	J105	D-56, D-61/D-64, D-69
2G	 Left Return #2	J105	D-56, D-61/D-64, D-69
2B	 Left Return #4 (Low)	J105	D-56, D-61/D-64, D-69
3R	 Left Side #7 (Low)	J105	D-56, D-61/D-64, D-69
3G	 Left Side #6	J106	D-56, D-61/D-64, D-69
3B	 Left Return #1 (High)	J105	D-56, D-61/D-64, D-69
4R	 Left Side #4	J106	D-56, D-61/D-64, D-69
4G	 Left Side #3	J106	D-56, D-61/D-64, D-69
4B	 Left Side #5	J106	D-56, D-61/D-64, D-69
5R	 Left Side #1 (High)	J106	D-56, D-61/D-64, D-69
5G	 Smaug Area #4 (Low)	J106	D-56, D-61/D-64, D-69
5B	 Left Side #2	J106	D-56, D-61/D-64, D-69
6B	 Smaug Area #3	J106	D-56, D-61/D-64, D-69
9R	 Upper Left Corner #2	J108	D-56, D-61/D-64, D-69
9G	 Upper Left Corner #1 (High)	J108	D-56, D-61/D-64, D-69
9B	 Upper Left Corner #3 (Low)	J108	D-56, D-61/D-64, D-69
10R	 Smaug Area #1 (High)	J108	D-56, D-61/D-64, D-69
10G	 Captive Ball Target #1 (High)	J108	D-56, D-61/D-64, D-69
10B	 Smaug Area #2	J108	D-56, D-61/D-64, D-69
11G	 Left Upper Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
11B	 Captive Ball Target #2 (Low)	J108	D-56, D-61/D-64, D-69
12R	 Left Lower Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
12G	 Right Lower Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
12B	 Left Middle Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70

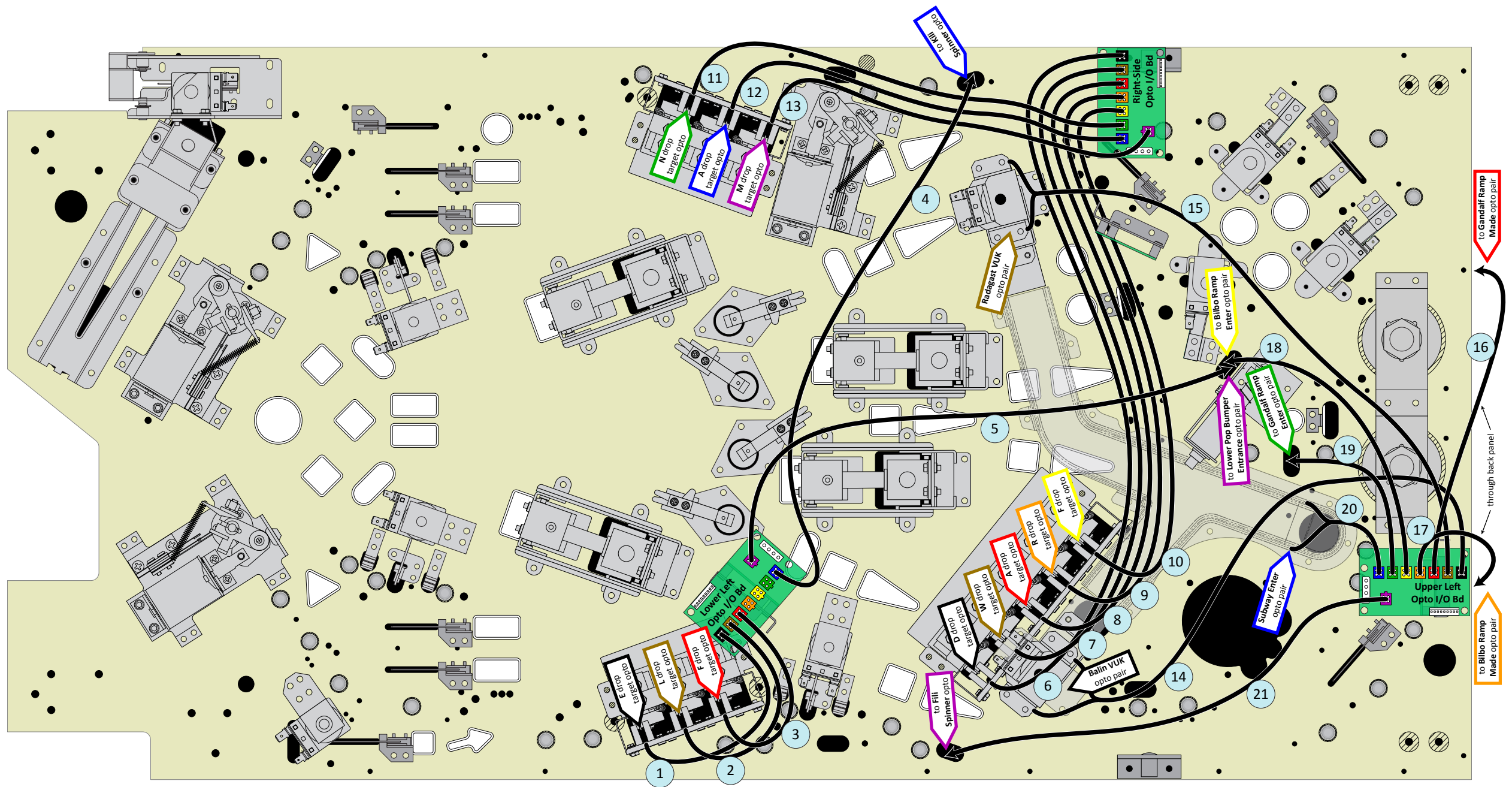
LED#	Location/Function	BAG Bd Connector	Details 1mm/2.5mm
13R	 Right Upper Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
13G	 Ramp U-Turn Flasher (above steel ramp)	J109	D-56, D-62/D-64, D-70
13B	 Right Middle Flasher (mounted to plastic)	J109	D-56, D-62/D-64, D-70
14R	 Spider Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
14G	 Goblin Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
15R	 Warg Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
15G	 Smaug Gold Pile Flasher (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
15B	 Orc Pop-Up (under playfield)	J110	D-56, D-62/D-64, D-70
16R	 Smaug Left Eye (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
16G	 Smaug Right Eye (mounted in sculpture)	J110	D-56, D-62/D-64, D-70
16B	 Back Panel Insert Flasher	J110	D-56, D-62/D-64, D-70
19G	 Right Side #3	J112	D-56, D-62/D-64, D-70
20R	 Right Side #1 (High)	J112	D-56, D-62/D-64, D-70
20G	 Right Pop Bumper #2 (Low)	J112	D-56, D-62/D-64, D-70
20B	 Right Side #2	J112	D-56, D-62/D-64, D-70
21R	 Upper Right Corner #3 (Low)	J112	D-56, D-62/D-64, D-70
21G	 Upper Right Corner #2	J112	D-56, D-62/D-64, D-70
21B	 Right Pop Bumper #1 (High)	J112	D-56, D-62/D-64, D-70
22R	 Right Sling #1 (High)	J113	D-56, D-63/D-64, D-71
22G	 Right Sling #2	J113	D-56, D-63/D-64, D-71
22B	 Upper Right Corner #1 (High)	J112	D-56, D-62/D-64, D-70
23R	 Right Return #3 (Low)	J113	D-56, D-63/D-64, D-71
23G	 Right Return #2	J113	D-56, D-63/D-64, D-71
23B	 Right Sling #3 (Low)	J113	D-56, D-63/D-64, D-71
24R	 Right Side #5 (Low)	J113	D-56, D-63/D-64, D-71
24G	 Right Side #4	J113	D-56, D-63/D-64, D-71
24B	 Right Return #1 (High)	J113	D-56, D-63/D-64, D-71



GI Lighting & Flasher Wiring

Under Playfield

Cable	Description	Part Number	BAG Bd Connector	Details
1	Hobbit Lower Left GI Cable, 1mm	19-3092-01	J105	D-56, D-61
or	Hobbit Lower Left GI Cable, 2.5mm	19-3092-11		D-64, D-69
2	Hobbit Lower Right GI Cable, 1mm	19-3092-02	J113	D-56, D-63
or	Hobbit Lower Right GI Cable, 2.5mm	19-3092-12		D-64, D-71
3	Hobbit Left Side GI Cable, 1mm	19-3092-03	J106	D-56, D-61
or	Hobbit Left Side GI Cable, 2.5mm	19-3092-13		D-64, D-69
4	Hobbit Right/Upper Right GI Cable, 1mm	19-3092-04	J112	D-56, D-62
or	Hobbit Right/Upper Right GI Cable, 2.5mm	19-3092-14		D-64, D-70
5	Hobbit Upper Left GI Cable, 1mm	19-3092-05	J108	D-56, D-61
or	Hobbit Upper Left GI Cable, 2.5mm	19-3092-15		D-64, D-69
6	Hobbit Left/Right Side Flasher Cable, 1mm	19-3092-06	J109	D-56, D-62
or	Hobbit Left/Right Side Flasher Cable, 2.5mm	19-3092-16		D-64, D-70
7	Hobbit Pop-Ups/Smaug Lighting Cable, 1mm	19-3092-07	J110	D-56, D-62
or	Hobbit Pop-Ups/Smaug Lighting Cable, 2.5mm	19-3092-17		D-64, D-70
8	Ethernet Cable, Cat5E, Shielded, 2ft	19-3111-02	J103	D-56, D-60
9	Ethernet Cable, Cat5E, Shielded, 4ft	19-3111-04	J102	D-56, D-60
10	USB Cable, 2.0 A to Mini-B, M-M, 6ft	19-3100-06	J101	D-56, D-60

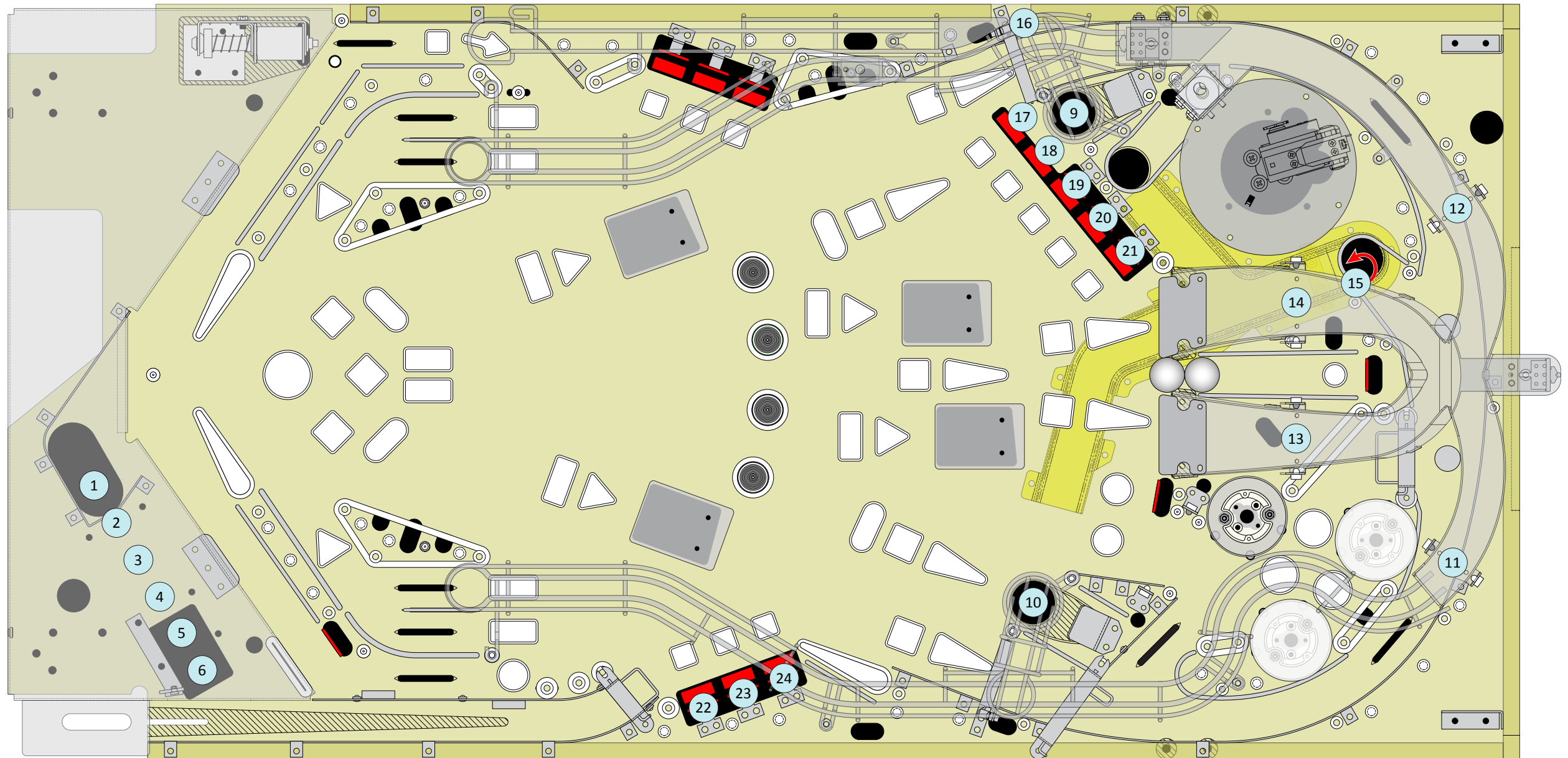


Opto Wiring

Under Playfield

Cable	Description	Function	Part Number	Opto I/O Board	Connector	Details
1	U-Shaped Opto Assy, OPB816Z, 12" Cable, BLK	ELF Drop Target Switch	18-7022-12-00	Lower Left	J1/BLK	D-7, D-9
2	U-Shaped Opto Assy, OPB816Z, 11" Cable, BRN	ELF Drop Target Switch	18-7022-11-01	Lower Left	J2/BRN	D-7, D-9
3	U-Shaped Opto Assy, OPB816Z, 9" Cable, RED	ELF Drop Target Switch	18-7022-09-02	Lower Left	J3/RED	D-7, D-9
4	U-Shaped Opto Assy, OPB812W, 24" Cable, BLU	Kili Spinner Switch	18-7021-24-06	Lower Left	J7/BLU	D-7, D-9
5	Opto Pair Assy, 24" Cable, VIO	Bag End Switch	18-7020-24-07	Lower Left	J8/VIO	D-7, D-9
6	U-Shaped Opto Assy, OPB816Z, 17" Cable, BLK	DWARF Drop Target Switch	18-7022-17-00	Right Side	J1/BLK	D-7, D-10
7	U-Shaped Opto Assy, OPB816Z, 15" Cable, BRN	DWARF Drop Target Switch	18-7022-15-01	Right Side	J2/BRN	D-7, D-10
8	U-Shaped Opto Assy, OPB816Z, 13" Cable, RED	DWARF Drop Target Switch	18-7022-13-02	Right Side	J3/RED	D-7, D-10
9	U-Shaped Opto Assy, OPB816Z, 12" Cable, ORN	DWARF Drop Target Switch	18-7022-12-03	Right Side	J4/ORN	D-7, D-10
10	U-Shaped Opto Assy, OPB816Z, 11" Cable, YEL	DWARF Drop Target Switch	18-7022-11-04	Right Side	J5/YEL	D-7, D-10
11	U-Shaped Opto Assy, OPB816Z, 18" Cable, GRN	MAN Drop Target Switch	18-7022-18-05	Right Side	J6/GRN	D-7, D-10
12	U-Shaped Opto Assy, OPB816Z, 17" Cable, BLU	MAN Drop Target Switch	18-7022-17-06	Right Side	J7/BLU	D-7, D-10
13	U-Shaped Opto Assy, OPB816Z, 16" Cable, VIO	MAN Drop Target Switch	18-7022-16-07	Right Side	J8/VIO	D-7, D-10
14	Hobbit Balin VUK Opto Cable, BLK	Balin VUK Switch	19-3073-01	Upper Left	J1/BLK	D-7, D-11
15	Hobbit Radagast VUK Opto Cable, BRN	Radagast VUK Switch	19-3073-00	Upper Left	J2/BRN	D-7, D-11
16	Opto Pair Assy, 20" Cable, RED	Gandalf Ramp Made Switch	18-7020-20-02	Upper Left	J3/RED	D-7, D-11
17	Opto Pair Assy, 14" Cable, ORN	Bilbo Ramp Made Switch	18-7020-14-03	Upper Left	J4/ORN	D-7, D-11
18	Opto Pair Assy, 17" Cable, YEL	Bilbo Ramp Enter Switch	18-7020-17-04	Upper Left	J5/YEL	D-7, D-11
19	Opto Pair Assy, 14" Cable, GRN	Gandalf Ramp Enter Switch	18-7020-14-05	Upper Left	J6/GRN	D-7, D-11
20	Opto Pair Assy, 8" Cable, BLU	Subway Enter Switch	18-7020-08-06	Upper Left	J7/BLU	D-7, D-11
21	U-Shaped Opto Assy, OPB812W, 21" Cable, VIO	Fili Spinner Switch	18-7021-21-07	Upper Left	J8/VIO	D-7, D-11

(Matrixed Switch wiring table on pg C-123)

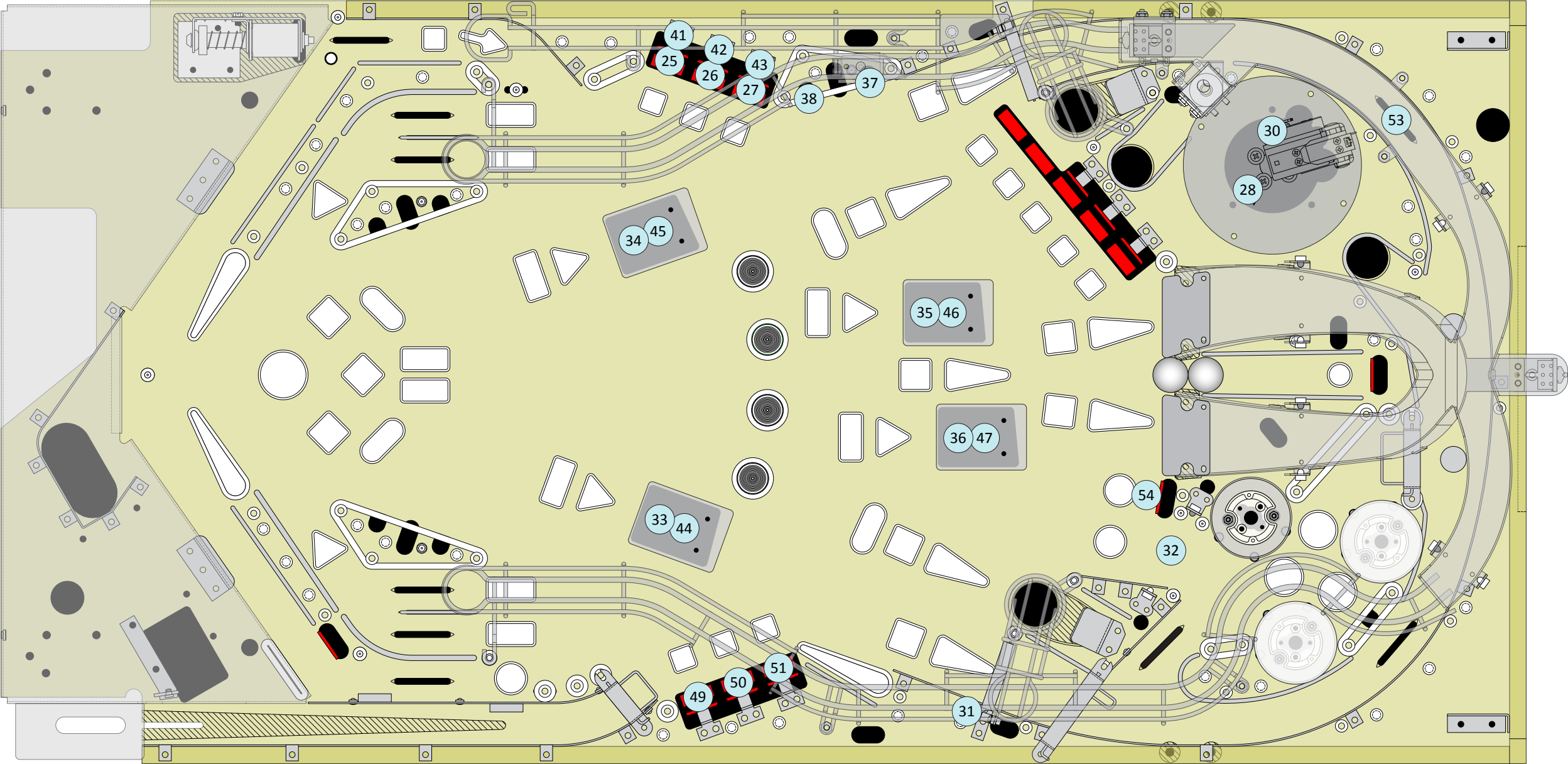


Playfield Switch Locations (1 of 3)

Above Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
1	5-Ball Trough #5 (Left)	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
2	5-Ball Trough #4	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
3	5-Ball Trough #3	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
4	5-Ball Trough #2	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
5	5-Ball Trough #1 (Right)	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
6	5-Ball Trough Jam	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
9	Balin VUK	Opto LED, Phototransistor Pair	15-5004-01, 15-5004-00	51-0012-01	C-25
10	Radagast VUK	Opto LED, Phototransistor Pair	15-5004-01, 15-5004-00	51-0012-00	C-24
11	Gandalf Ramp Made	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
12	Bilbo Ramp Made	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
13	Bilbo Ramp Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
14	Gandalf Ramp Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
15	Subway Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	31-5011-00	C-17
16	Fili Spinner	U-Shaped Opto	18-5003-00	18-7002-02	C-16
17	DWARF Drop Tgt	U-Shaped Opto	18-5000-00	51-0017-00	C-28
18	DWARF Drop Tgt	U-Shaped Opto	18-5000-00	51-0017-00	C-28
19	DWARF Drop Tgt	U-Shaped Opto	18-5000-00	51-0017-00	C-28
20	DWARF Drop Tgt	U-Shaped Opto	18-5000-00	51-0017-00	C-28
21	DWARF Drop Tgt	U-Shaped Opto	18-5000-00	51-0017-00	C-28
22	MAN Drop Tgt	U-Shaped Opto	18-5000-00	51-0015-00	C-26
23	MAN Drop Tgt	U-Shaped Opto	18-5000-00	51-0015-00	C-26
24	MAN Drop Tgt	U-Shaped Opto	18-5000-00	51-0015-00	C-26

(Matrixed Switch wiring table on pg C-123)

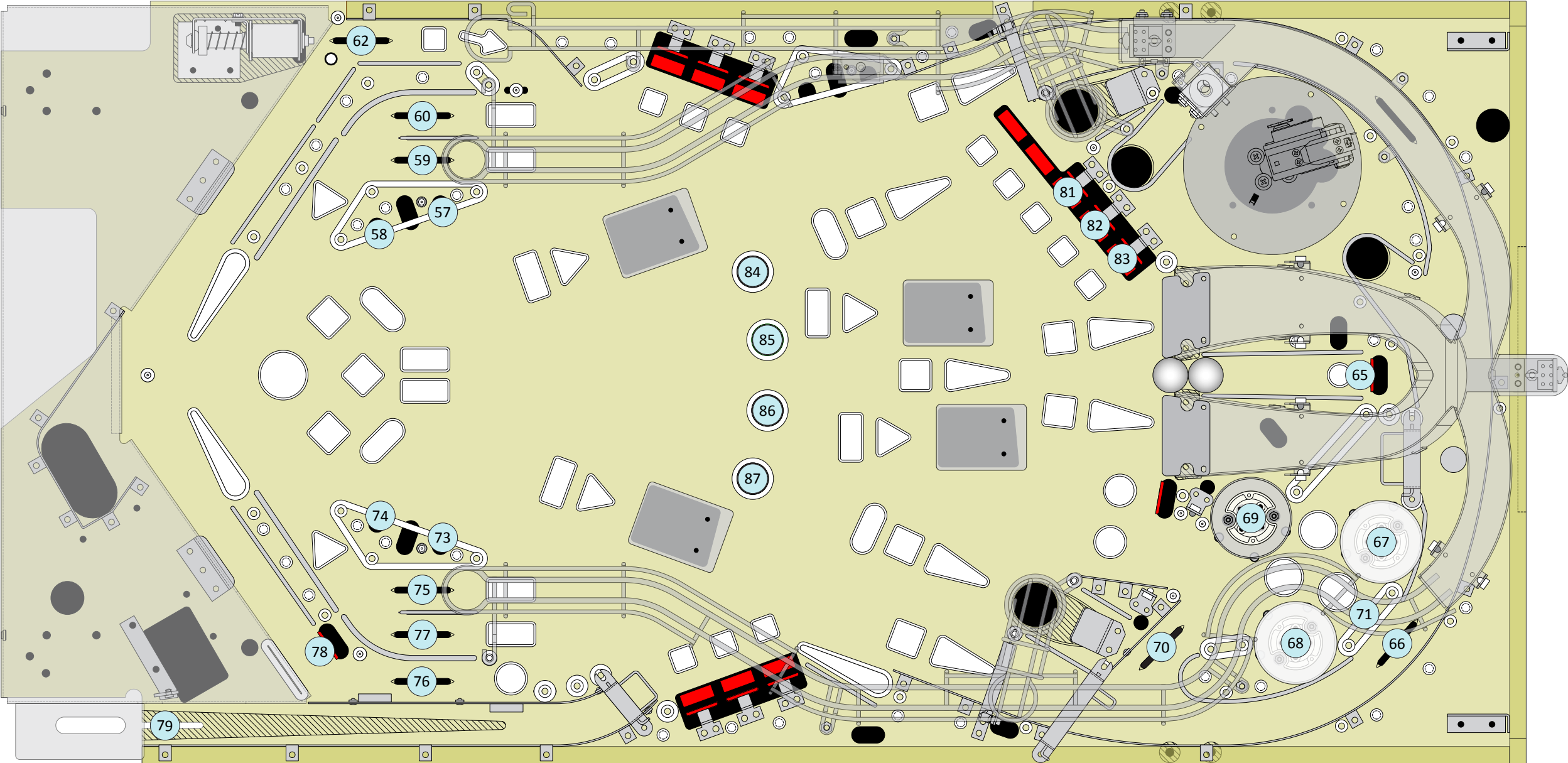


Playfield Switch Locations (2 of 3)

Above Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
25	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
26	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
27	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
28	Smaug Left Limit	U-Shaped Opto, PCB Mount	18-5004-0T	52-0038-00	D-72, C-46
30	Smaug Right Limit	U-Shaped Opto, PCB Mount	18-5004-0T	52-0038-00	D-72, C-46
31	Kili Spinner	U-Shaped Opto	18-5003-00	18-7002-01	C-16
32	Bag End	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	51-0071-00	C-38
33	Warg Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-02	C-50
34	Spider Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-03	C-50
35	Goblin Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-00	C-50
36	Orc Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-01	C-50
37	Upper Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-03	C-20
38	Upper Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-03	C-20
41	Gloin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
42	Oin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
43	Dwalin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
44	Warg Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-02	C-50
45	Spider Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-03	C-50
46	Goblin Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-00	C-50
47	Orc Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-01	C-50
49	Ori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
50	Dori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
51	Nori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
53	Left Orbit	Microswitch & Wireform	18-3004-01	-	-
54	Mystery Target	Round Stand-Up Target, Front Mount, Blue	18-9002-06	-	-

(Matrixed Switch wiring table on pg C-123)

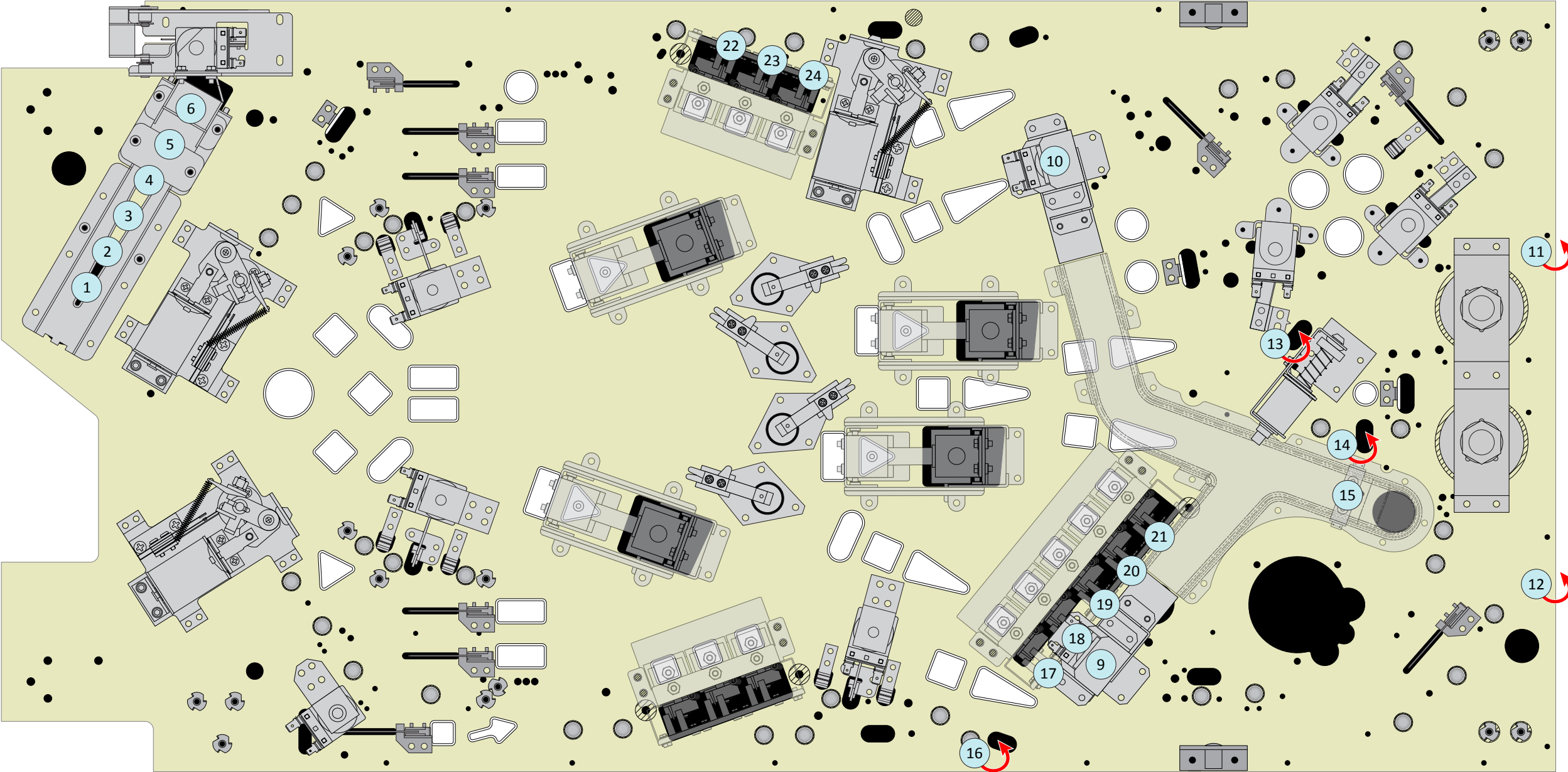


Playfield Switch Locations (3 of 3)

Above Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
57	Left Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-01	C-20
58	Left Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-01	C-20
59	Orc Return Lane	Microswitch & Wireform	18-3004-01	-	-
60	Warg Return Lane	Microswitch & Wireform	18-3004-01	-	-
62	Left Outlane (Kickback)	Microswitch & Wireform	18-3004-01	-	-
65	Thorin Target (Captive)	Square Stand-Up Target, Front Mount, 3D, Blue	18-9004-06	-	-
66	Right Orbit	Microswitch & Wireform	18-3004-01	-	-
67	Upper Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
68	Right Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
69	Left Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
70	Pop Bumper Exit Lane	Microswitch & Wireform	18-3004-01	-	-
71	Pop Bumper Area Rubber	Stand-Up Leaf	18-7008-01	-	-
73	Right Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-02	C-20
74	Right Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-02	C-20
75	Goblin Return Lane	Microswitch & Wireform	18-3004-01	-	-
76	Right Outlane (Gollum)	Microswitch & Wireform	18-3004-01	-	-
77	Spider Return Lane	Microswitch & Wireform	18-3004-01	-	-
78	Beorn Target	Round Stand-Up Target, Front Mount, Red	18-9002-02	-	-
79	Shooter Lane	Microswitch & Wireform	18-3001-00	51-0026-00	C-32
81	Bifur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
82	Bofur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
83	Bombur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
84	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
85	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
86	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
87	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16

(Matrixed Switch wiring table on pg C-123)

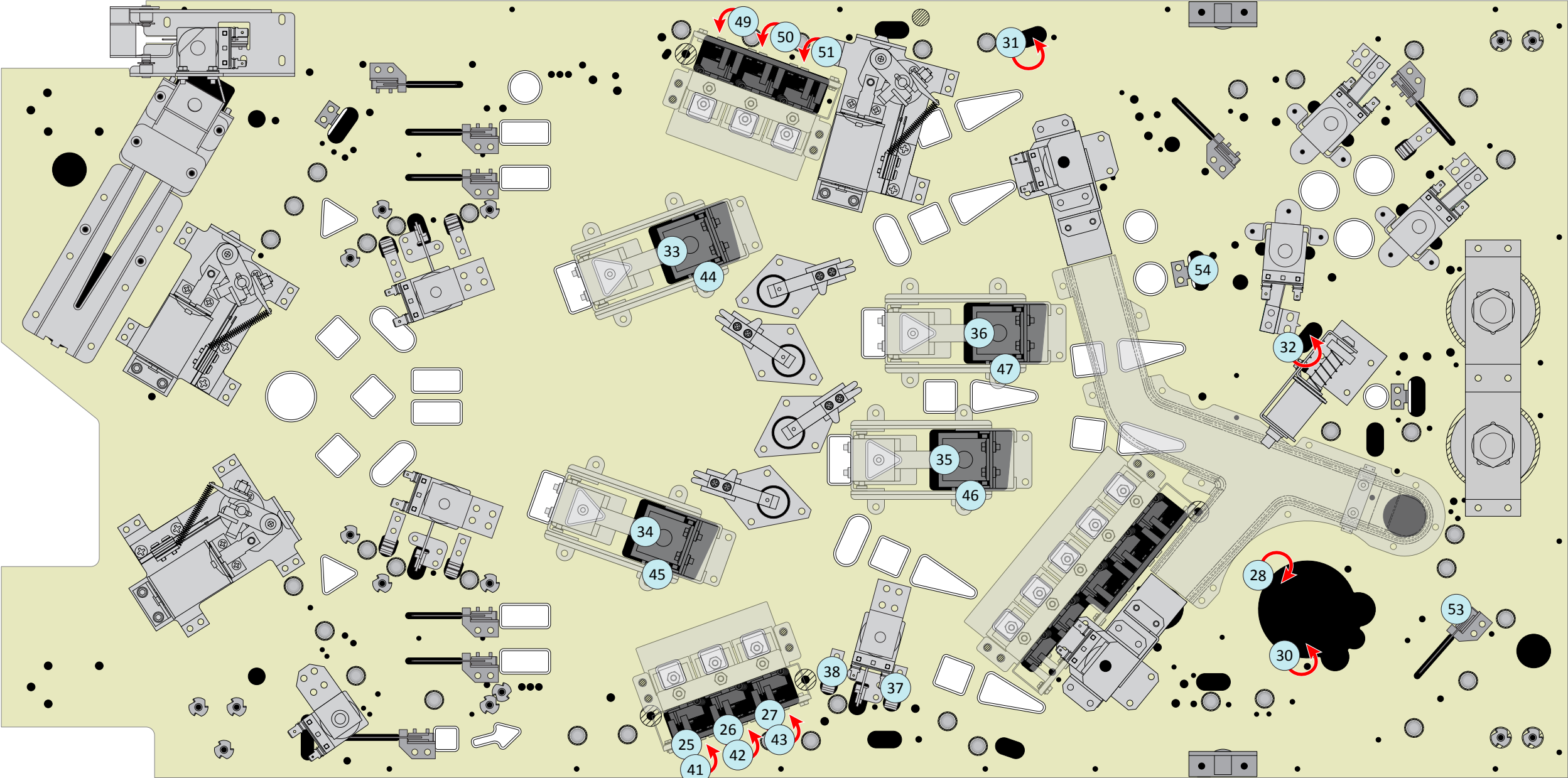


Playfield Switch Locations (1 of 3)

Under Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
1	5-Ball Trough #5 (Left)	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
2	5-Ball Trough #4	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
3	5-Ball Trough #3	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
4	5-Ball Trough #2	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
5	5-Ball Trough #1 (Right)	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
6	5-Ball Trough Jam	Opto LED, Phototransistor Pair	15-5007-01, 15-5007-00	51-0021-00	C-30
9	Balin VUK	Opto LED, Phototransistor Pair	15-5004-01, 15-5004-00	51-0012-01	C-25
10	Radagast VUK	Opto LED, Phototransistor Pair	15-5004-01, 15-5004-00	51-0012-00	C-24
11	Gandalf Ramp Made	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
12	Bilbo Ramp Made	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
13	Bilbo Ramp Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
14	Gandalf Ramp Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	52-0042-00	C-48
15	Subway Enter	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	31-5011-00	C-17
16	Fili Spinner	U-Shaped Opto	18-5003-00	18-7002-02	C-16
17	DWARF Drop Target	U-Shaped Opto	18-5000-00	51-0017-00	C-28
18	DWARF Drop Target	U-Shaped Opto	18-5000-00	51-0017-00	C-28
19	DWARF Drop Target	U-Shaped Opto	18-5000-00	51-0017-00	C-28
20	DWARF Drop Target	U-Shaped Opto	18-5000-00	51-0017-00	C-28
21	DWARF Drop Target	U-Shaped Opto	18-5000-00	51-0017-00	C-28
22	MAN Drop Target	U-Shaped Opto	18-5000-00	51-0015-00	C-26
23	MAN Drop Target	U-Shaped Opto	18-5000-00	51-0015-00	C-26
24	MAN Drop Target	U-Shaped Opto	18-5000-00	51-0015-00	C-26

(Matrixed Switch wiring table on pg C-123)

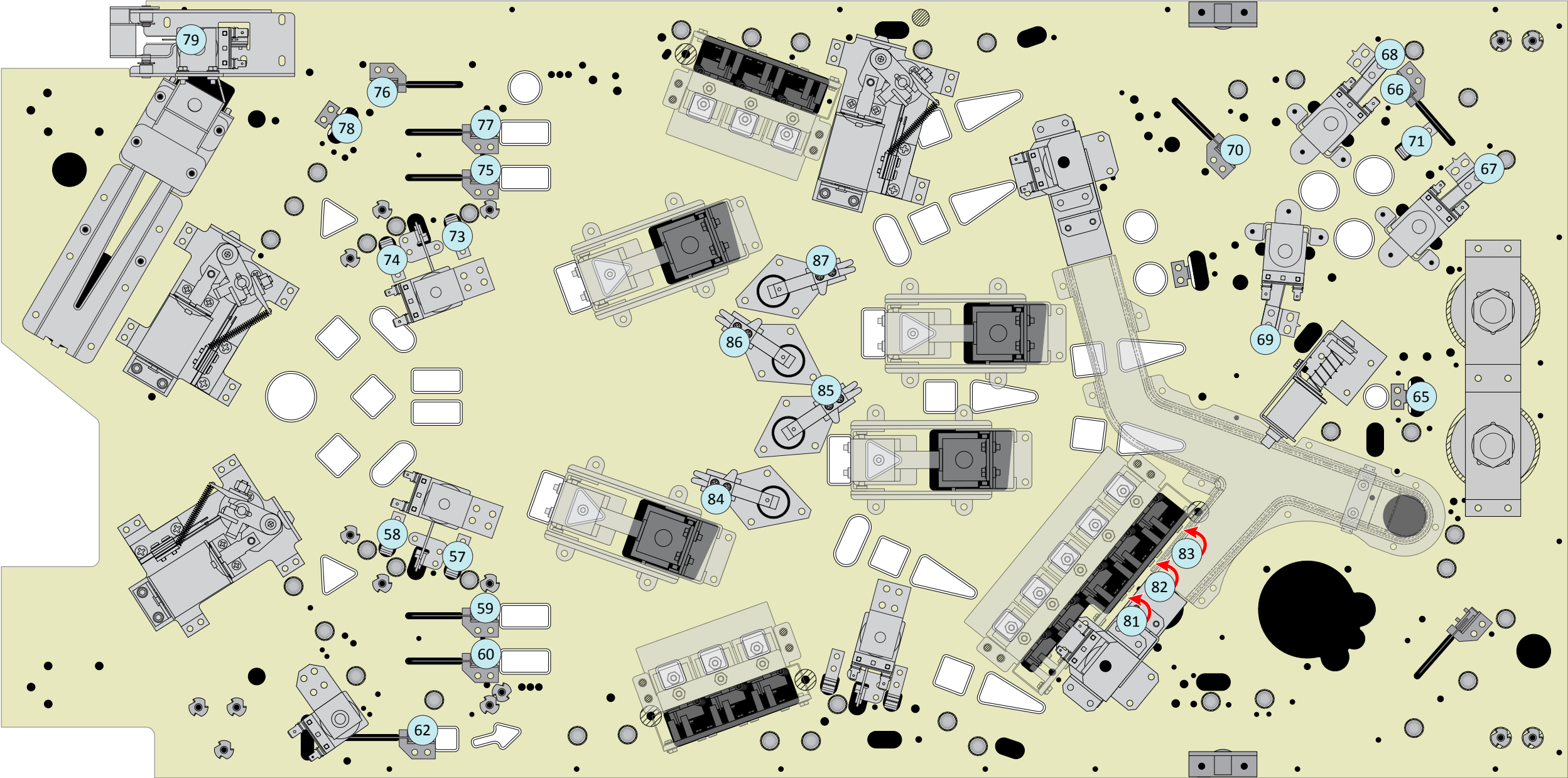


Playfield Switch Locations (2 of 3)

Under Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
25	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
26	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
27	ELF Drop Target	U-Shaped Opto	18-5000-00	51-0015-01	C-26
28	Smaug Left Limit	U-Shaped Opto, PCB Mount	18-5004-0T	52-0038-00	D-72, C-46
30	Smaug Right Limit	U-Shaped Opto, PCB Mount	18-5004-0T	52-0038-00	D-72, C-46
31	Kili Spinner	U-Shaped Opto	18-5003-00	18-7002-01	C-16
32	Bag End	Opto LED, Phototransistor Pair	18-5001-00, 18-5001-01	51-0071-00	C-38
33	Warg Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-02	C-50
34	Spider Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-03	C-50
35	Goblin Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-00	C-50
36	Orc Pop-Up Hit	Stand-Up Leaf	18-0006-00	52-0044-01	C-50
37	Upper Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-03	C-20
38	Upper Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-03	C-20
41	Gloin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
42	Oin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
43	Dwalin Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
44	Warg Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-02	C-50
45	Spider Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-03	C-50
46	Goblin Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-00	C-50
47	Orc Up	Microswitch w/Roller Actuator	18-3005-01	52-0044-01	C-50
49	Ori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
50	Dori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
51	Nori Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
53	Left Orbit	Microswitch & Wireform	18-3004-01	-	-
54	Mystery Target	Round Stand-Up Target, Front Mount, Blue	18-9002-06	-	-

(Matrixed Switch wiring table on pg C-123)

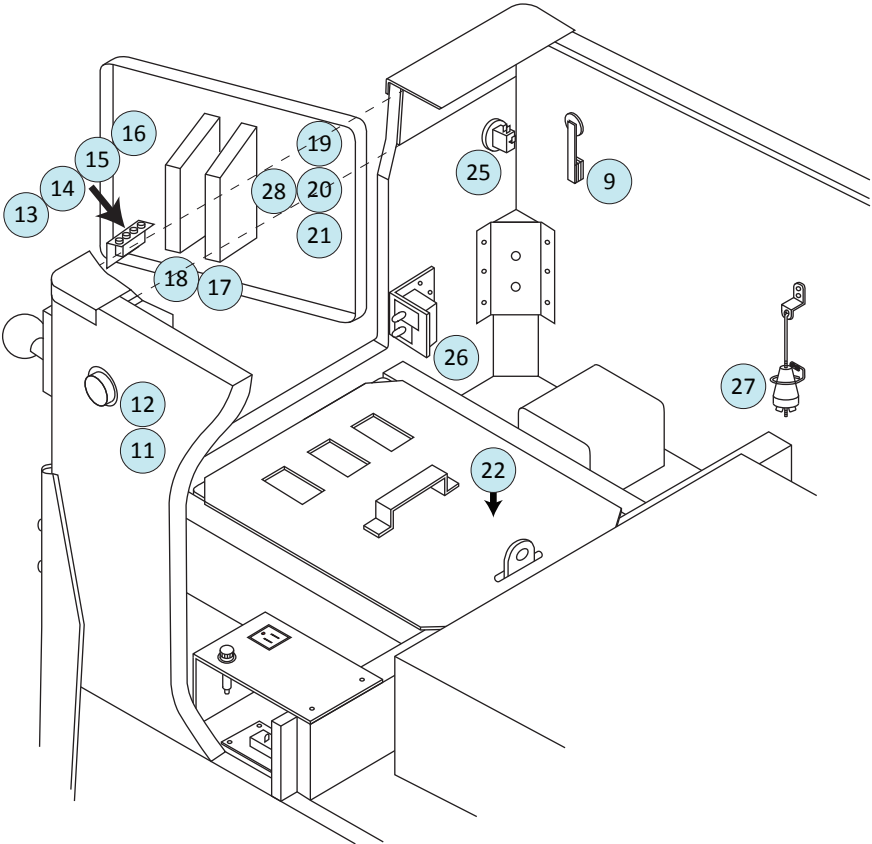
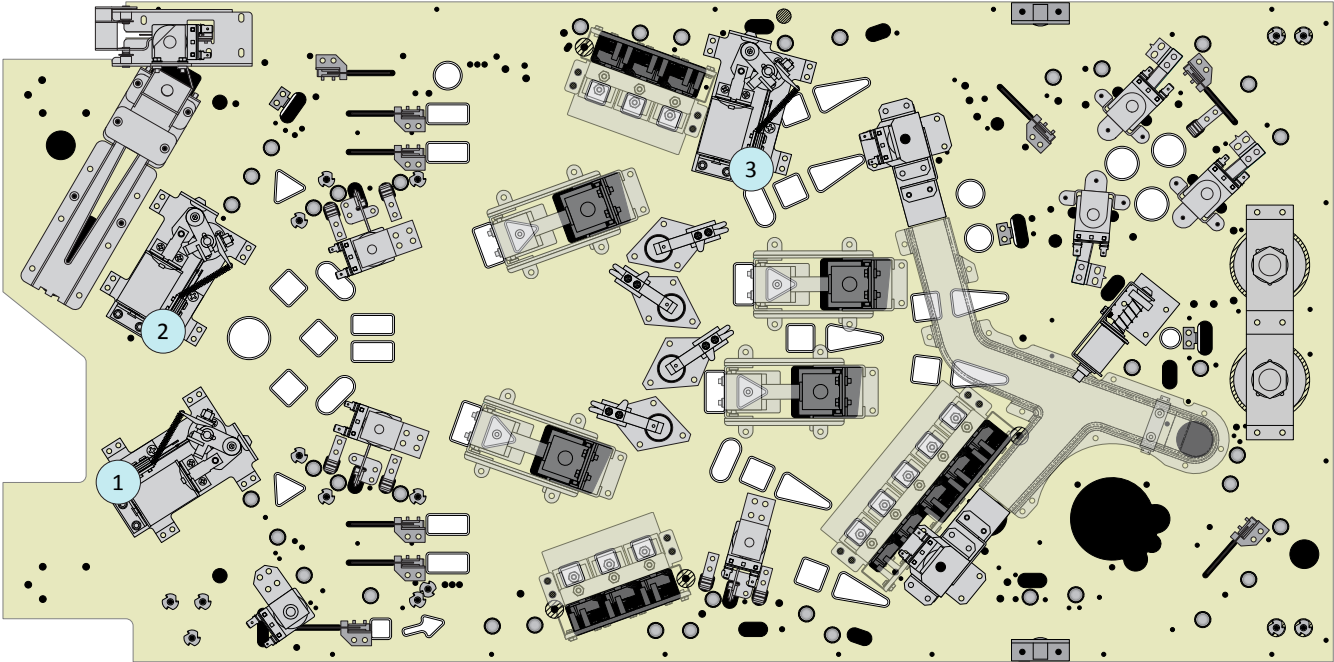
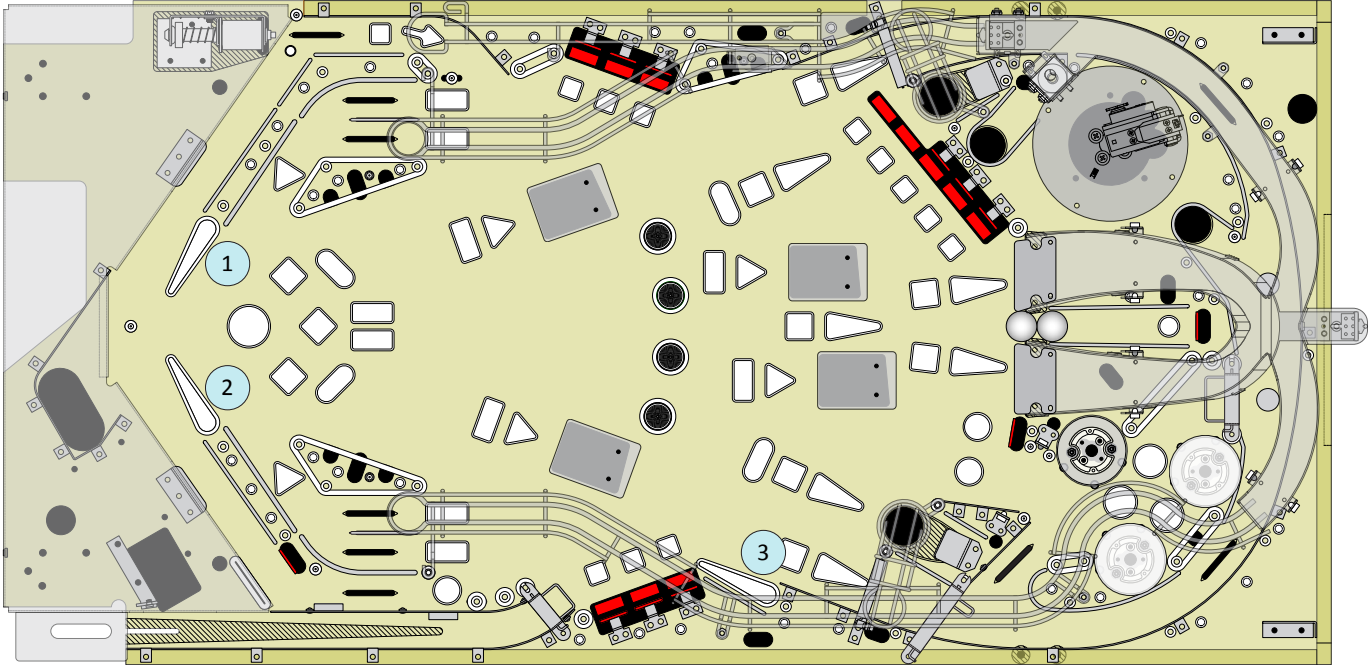


Playfield Switch Locations (3 of 3)

Under Playfield

Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
57	Left Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-01	C-20
58	Left Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-01	C-20
59	Orc Return Lane	Microswitch & Wireform	18-3004-01	-	-
60	Warg Return Lane	Microswitch & Wireform	18-3004-01	-	-
62	Left Outlane (Kickback)	Microswitch & Wireform	18-3004-01	-	-
65	Thorin Target (Captive)	Square Stand-Up Target, Front Mount, 3D, Blue	18-9004-06	-	-
66	Right Orbit	Microswitch & Wireform	18-3004-01	-	-
67	Upper Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
68	Right Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
69	Left Pop Bumper	Pop Bumper Leaf	18-7007-00	51-0004-01	C-22
70	Pop Bumper Exit Lane	Microswitch & Wireform	18-3004-01	-	-
71	Pop Bumper Area Rubber	Stand-Up Leaf	18-7008-01	-	-
73	Right Slingshot, High	Stand-Up Leaf	18-7008-00	51-0003-02	C-20
74	Right Slingshot, Low	Stand-Up Leaf	18-7008-00	51-0003-02	C-20
75	Goblin Return Lane	Microswitch & Wireform	18-3004-01	-	-
76	Right Outlane (Gollum)	Microswitch & Wireform	18-3004-01	-	-
77	Spider Return Lane	Microswitch & Wireform	18-3004-01	-	-
78	Beorn Target	Round Stand-Up Target, Front Mount, Red	18-9002-02	-	-
79	Shooter Lane	Microswitch & Wireform	18-3001-00	51-0026-00	C-32
81	Bifur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
82	Bofur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
83	Bombur Target	Square Stand-Up Target, Top Mount, Yellow	18-9009-04	-	-
84	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
85	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
86	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16
87	LOCK Rollover	Rollover Leaf	18-0004-00	18-7003-00	C-16

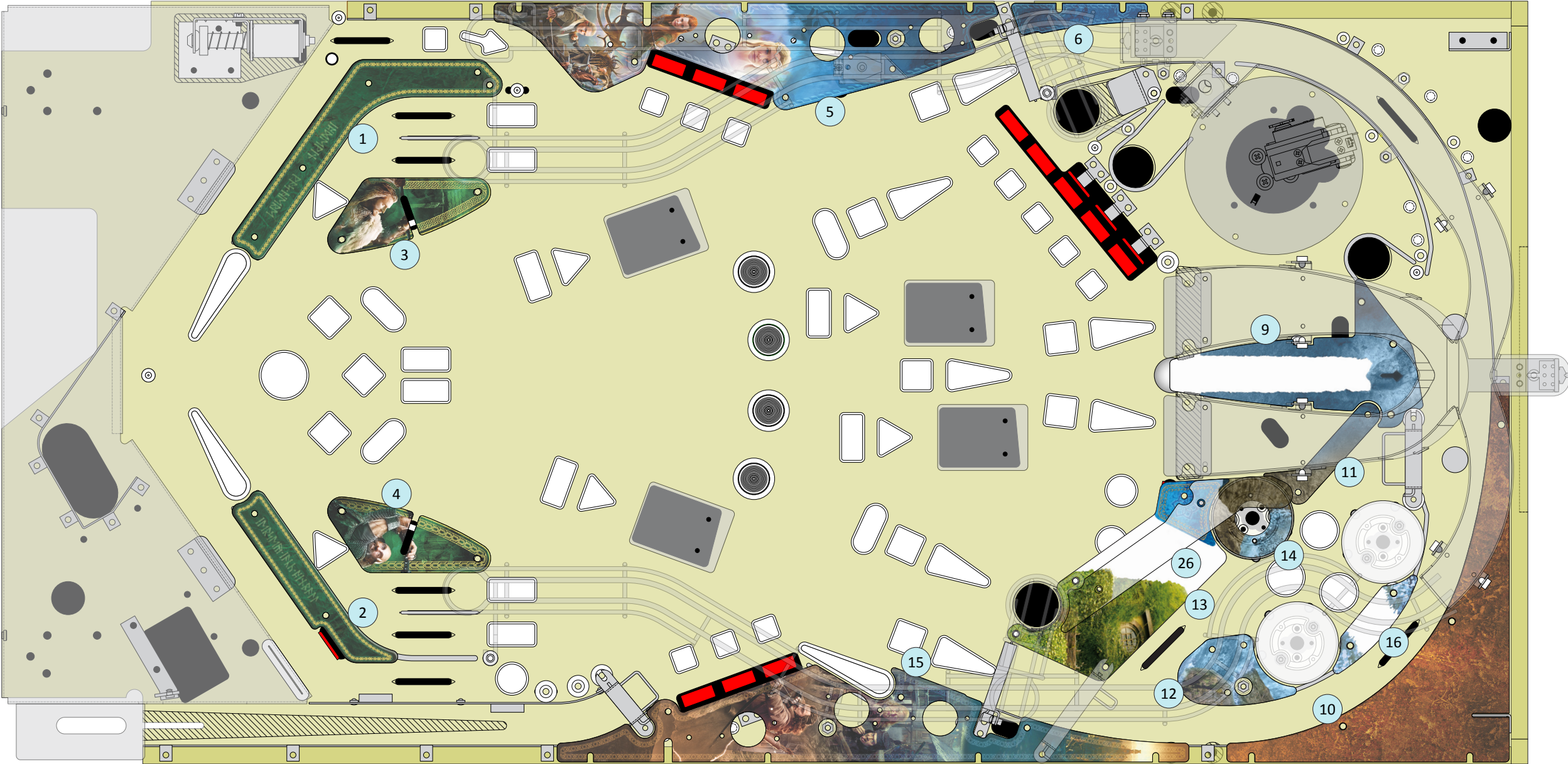
(Matrixed Switch wiring table on pg C-123)



Dedicated Switch Locations

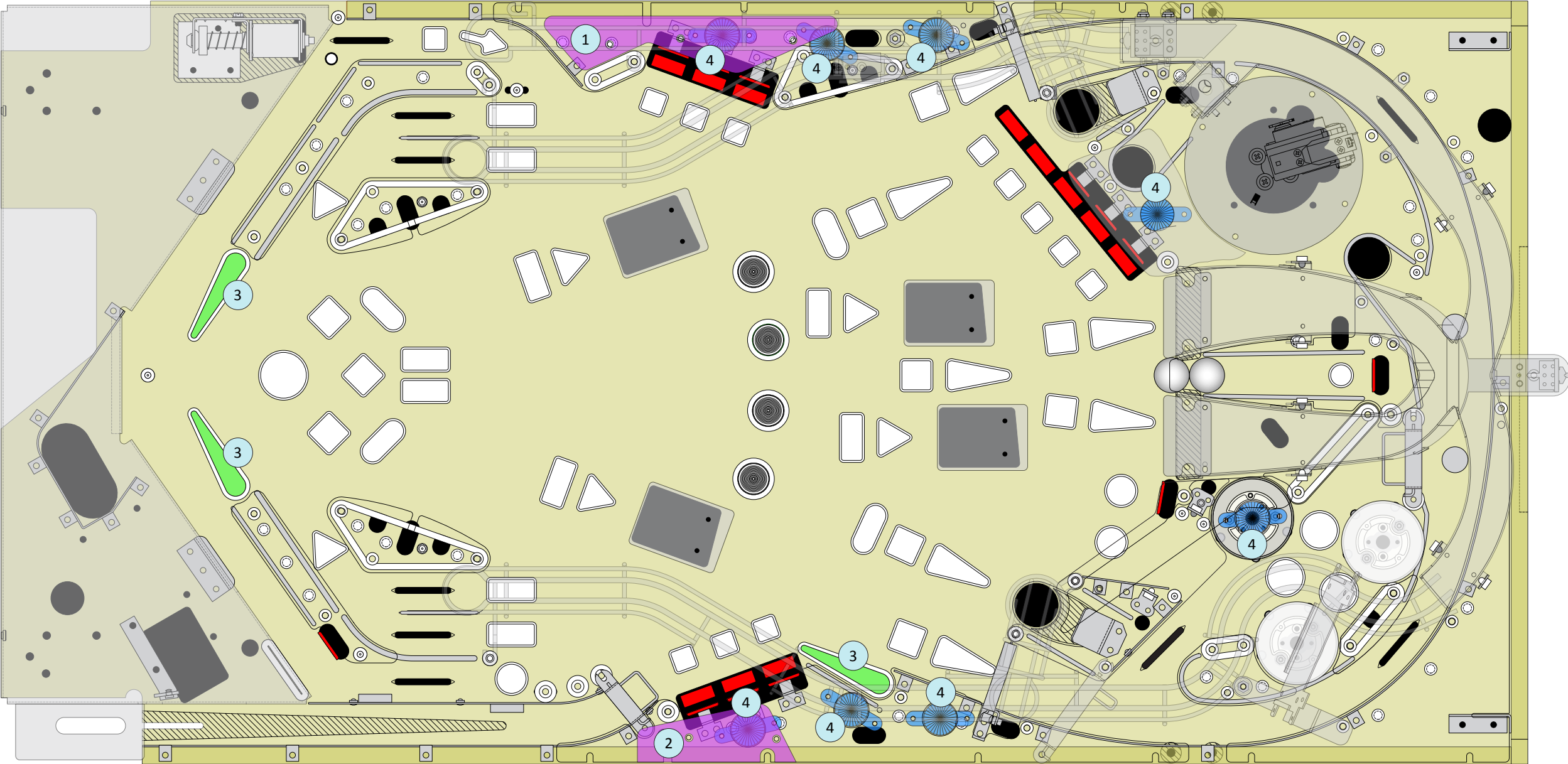
Switch	Switch Function	Switch Type	Part Number	Part of Assembly	Drawing
1	Left Flipper EOS	Leaf	18-0001-00	51-0002-00	C-19
2	Right Flipper EOS	Leaf	18-0001-00	51-0001-00	C-18
3	Upper Right Flipper EOS	Leaf	18-0001-00	51-0001-13	C-18
9	Left Flipper Switch	Leaf	18-0005-00	-	-
11	Right Flipper Switch, Lower	Leaf	18-0005-01	-	-
12	Right Flipper Switch, Upper	Leaf	18-0005-01	-	-
13	Enter/Menu Button	Pushbutton, Momentary Contact	-	-	-
14	Up/Volume+ Button	Pushbutton, Momentary Contact	-	-	-
15	Down/Volume- Button	Pushbutton, Momentary Contact	-	-	-
16	Escape/Service Credit Button	Pushbutton, Momentary Contact	-	-	-
17	Left Coin Switch	Microswitch & Wireform	-	-	-
18	Right Coin Switch	Microswitch & Wireform	-	-	-
19	Center Dollar Bill Acceptor	Electronic	-	-	-
20	4th Coin Slot Switch	Electronic	-	-	-
21	5th Coin Slot Switch	Electronic	-	-	-
22	Ticket Mech Notch Switch (under cabinet)	U-Shaped Opto	-	-	-
25	Start Button	Microswitch In A Pushbutton	18-7023-04	-	-
26	Coin Door Open	Large Microswitch	18-3008-00	51-0035-00	-
27	Plumb Bob Tilt	Contact	-	51-0028-00	C-33
28	Ring Button (inside cabinet front)	Mini Switch w/Blade Actuator	18-3015-00	51-0066-00	C-10

(Dedicated Switch wiring table on pg C-124)



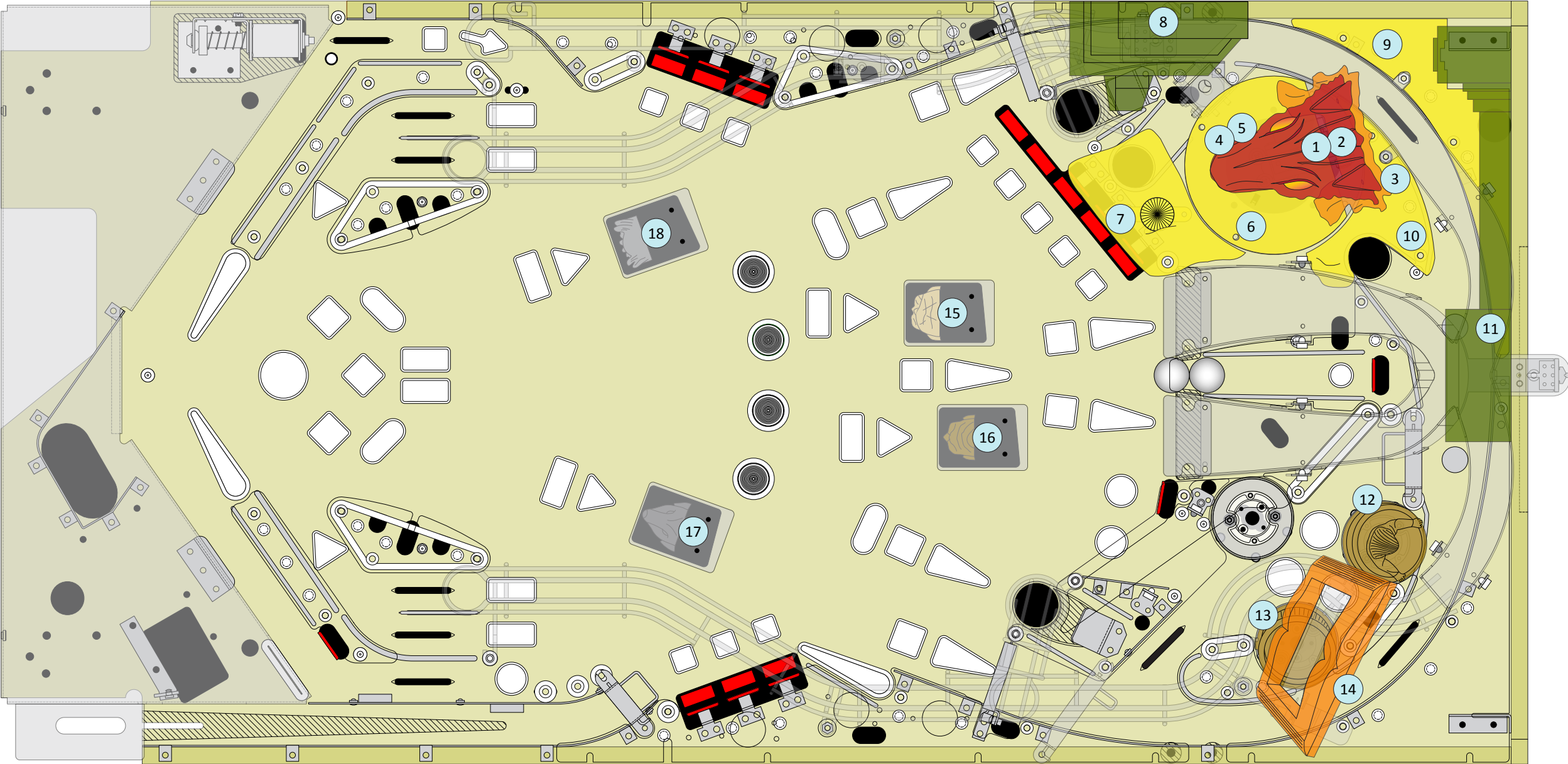
Printed Playfield Plastics

Item	Part Number	Description
1	30-3003-01	Hobbit Left Inlane Plastic
2	30-3003-02	Hobbit Right Inlane Plastic
3	30-3003-03	Hobbit Left Slingshot Plastic
4	30-3003-04	Hobbit Right Slingshot Plastic
5	30-3003-05	Hobbit Left Side/Elves Plastic
6	30-3003-06	Hobbit Upper Left Side Plastic
9	30-3003-09	Hobbit Captive Ball Plastic
10	30-3003-10	Hobbit Upper Right Corner Plastic
11	30-3003-11	Hobbit Under-Ramp Plastic
12	30-3003-12	Hobbit Right Bumper Area Plastic
13	30-3003-13	Hobbit Bag End Plastic, Lower
14	30-3003-14	Hobbit Left Pop Bumper Plastic
15	30-3003-15	Hobbit Right Side/Men Plastic
16	30-3003-16	Hobbit Upper Bumper Area Plastic
26	30-3003-26	Hobbit Bag End Plastic, Upper



Clear Plastics, Flasher Domes & Flipper Bats

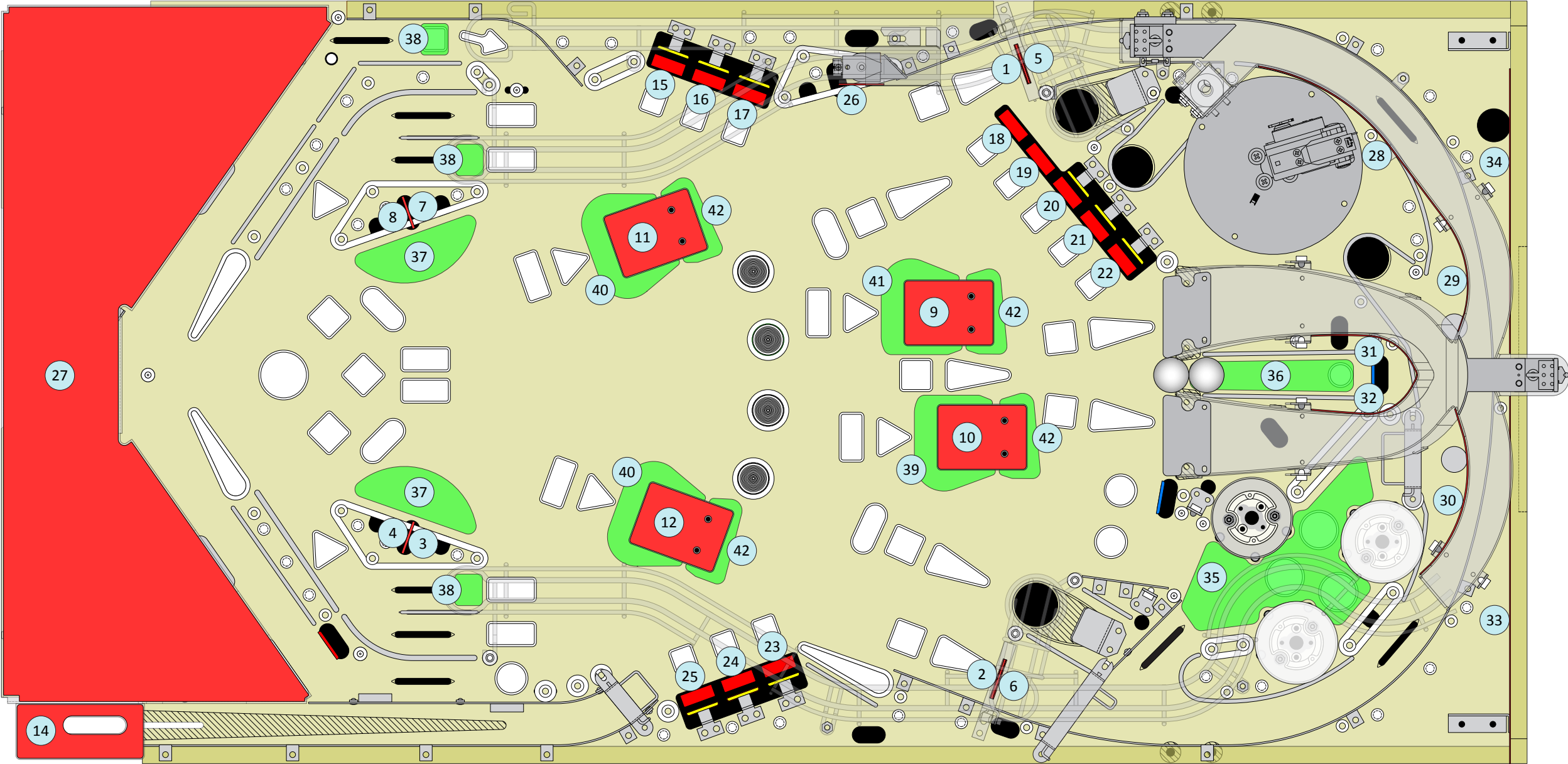
Item	Part Number	Description	Qty
1	30-3003-24	Hobbit Left Side/Elves Clear Plastic	1
2	30-3003-25	Hobbit Right Side/Men Clear Plastic	1
3	30-0012-04	Flipper Bat, Yellow	3
or BA	30-0012-00	Flipper Bat, Black	3
4	30-0076-04	Mini Flasher Dome w/Tabs, Yellow	8



Playfield Sculptures

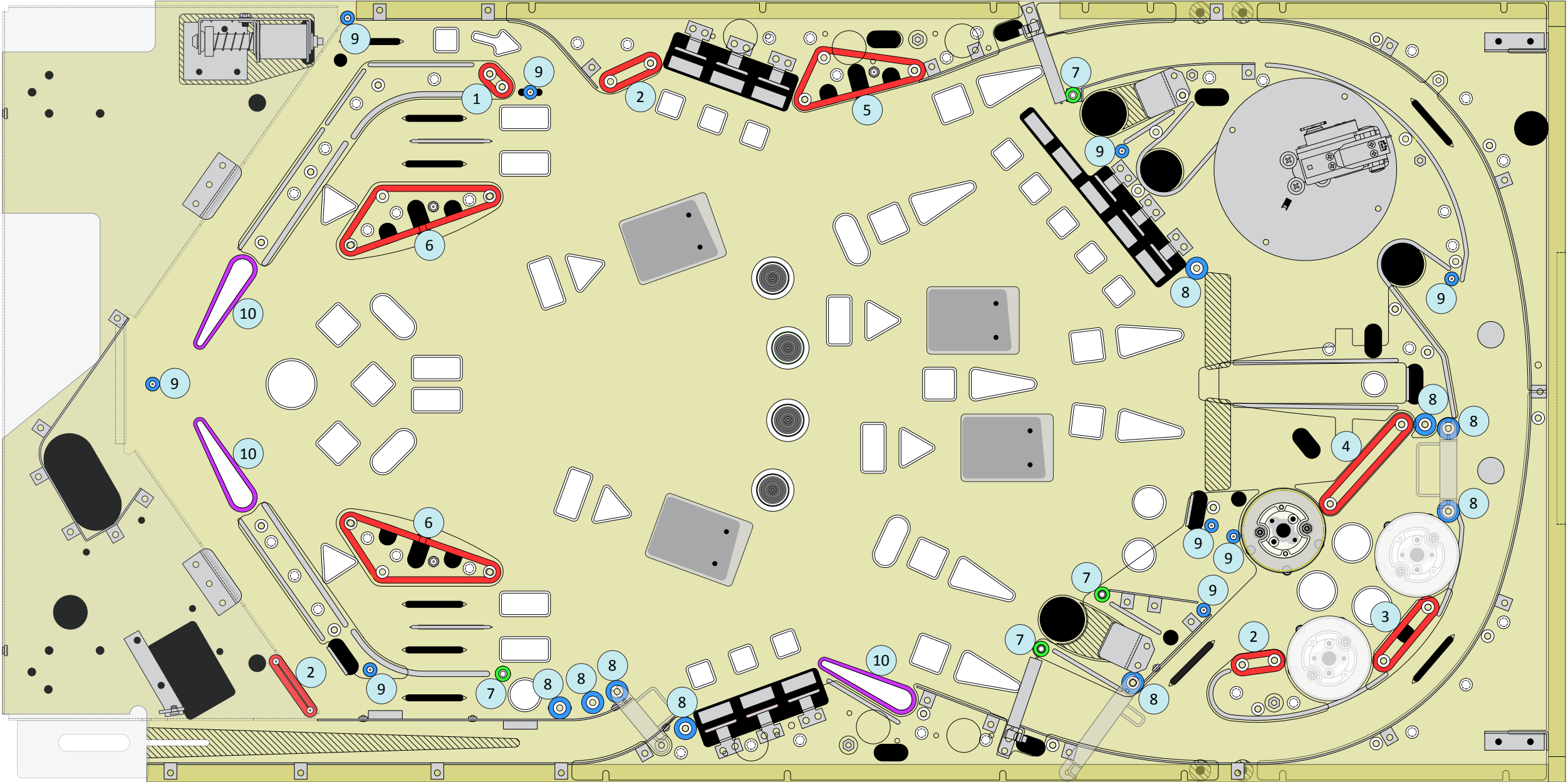
Item	Part Number	Description
1	LE 32-0020-00	Hobbit Smaug Head Sculpture, Red
	SE 32-0020-01	Hobbit Smaug Head Sculpture, Gold
	Std 32-0020-00	Hobbit Smaug Head Sculpture, Red
2	LE 32-0029-00	Hobbit Smaug Jaw Sculpture, Red
	SE 32-0029-01	Hobbit Smaug Jaw Sculpture, Gold
	Std 32-0029-00	Hobbit Smaug Jaw Sculpture, Red
3	LE 32-0028-00	Hobbit Smaug Back Sculpture, Red
	SE 32-0028-01	Hobbit Smaug Back Sculpture, Gold
	Std 32-0028-00	Hobbit Smaug Back Sculpture, Red
4	32-0038-00	Hobbit Smaug Upper Teeth Sculpture
5	32-0039-00	Hobbit Smaug Lower Teeth/Tongue Sculpture
6	32-0035-00	Hobbit Smaug Gold Pile Sculpture
7	32-5003-00	Hobbit Smaug Front Gold Pile Assembly
	a) 10-0177-00	Flasher/GI Mtg Brkt, Steel
	b) 15-0027-00	GI LED Board
	c) 15-0028-0X	Single RGB LED Board
	d) 30-0076-04	Mini Flasher Dome w/Tabs, Yellow
	e) 32-0031-00	Hobbit Smaug Front Gold Pile Sculpture
	f) 82-0004-06	#4 x 3/8" PPH SMS (4 ea)
	g) 80-0004-03	4-40 x 3/16" PPH MS

Item	Part Number	Description
8	32-5004-00	Hobbit Left Pillar Assembly
	a) 10-0183-00	Hobbit Left Pillar Mtg Brkt
	b) 10-0189-00	Hobbit Left Pillar Seam Brkt
	c) 15-0028-0X	Single RGB LED Board
	d) 32-0033-00	Hobbit Left Pillar Sculpture, Top
	e) 32-0037-00	Hobbit Left Pillar Sculpture, Bottom
	f) 82-0004-06	#4 x 3/8" PPH SMS (2 ea)
	g) 82-2006-06	#6 x 3/8" HWH Phillips SMS (4 ea)
9	32-0032-00	Hobbit Upper Left Corner Gold Pile Sculpture
10	32-0036-00	Hobbit Smaug Right Side Gold Pile Sculpture
11	32-0034-00	Hobbit Back Panel Pillar Sculpture
12	32-0025-00	Hobbit Dwarf In Barrel Sculpture
13	32-0026-00	Hobbit Barrel Sculpture
14	32-0027-00	Hobbit Book LCD Frame
15	32-0021-00	Hobbit Pop-Up Goblin Head Sculpture
16	32-0022-00	Hobbit Pop-Up Orc Head Sculpture
17	32-0023-00	Hobbit Pop-Up Warg Head Sculpture
18	32-0024-00	Hobbit Pop-Up Spider Head Sculpture



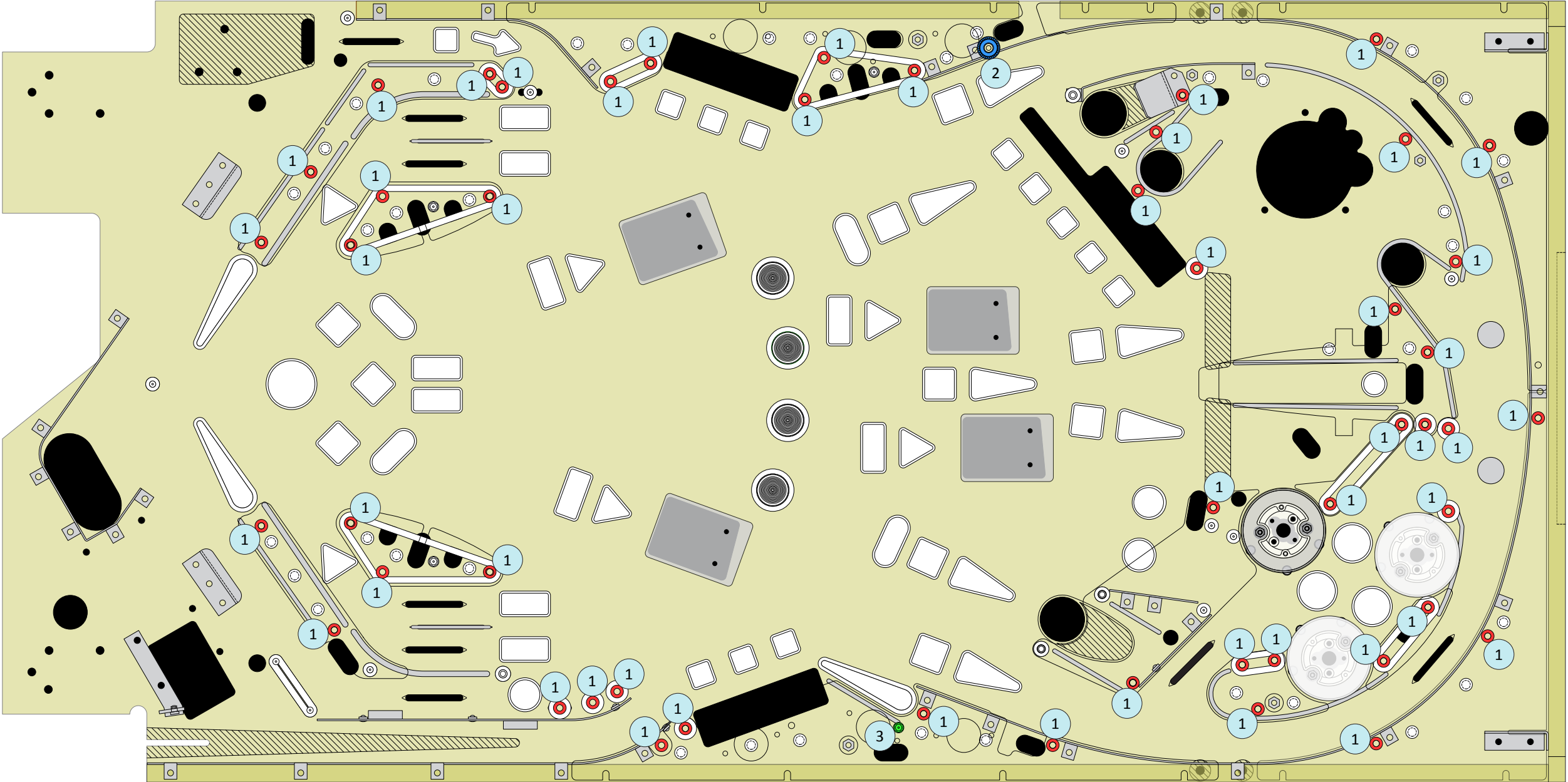
Game Decals & Mylar Playfield Protectors

Item	Part Number	Description	Part of Assy	Drawing	Item	Part Number	Description	Part of Assy	Drawing
1	62-0011-01	Hobbit Left Spinner Decal, Front	18-7002-02	C-16	23	62-0011-23	Hobbit MAN Drop Tgt Decal	51-0015-00	C-26
2	62-0011-02	Hobbit Right Spinner Decal, Front	18-7002-01	C-16	24	62-0011-24	Hobbit MAN Drop Tgt Decal	51-0015-00	C-26
3	62-0011-03	Hobbit Right Sling Axe Decal, Back	51-0003-02	C-20	25	62-0011-25	Hobbit MAN Drop Tgt Decal	51-0015-00	C-26
4	62-0011-04	Hobbit Right Sling Axe Decal, Front	51-0003-02	C-20	NS	62-0011-26	Hobbit Speaker Bar Decal (on Backbox Speaker Bar)	51-5010-01	C-40
5	62-0011-05	Hobbit Left Spinner Decal, Back	18-7002-02	C-16	26	62-0011-28	Hobbit Windlance Diverter Decal	13-2002-02	C-13
6	62-0011-06	Hobbit Right Spinner Decal, Back	18-7002-01	C-16	NS	62-0011-29	Hobbit Ring Button Decal (on Lockdown Bar)	51-0067-0X	-
7	62-0011-07	Hobbit Left Sling Axe Decal, Back	51-0003-01	C-20	27	62-0014-01	Hobbit Bottom Arch Decal	52-0037-00	C-43
8	62-0011-08	Hobbit Left Sling Axe Decal, Front	51-0003-01	C-20	28	62-0014-02	Hobbit Steel Ramp Decal, Upper Left Side, Left	52-0042-00	C-48
9	62-0011-09	Hobbit Goblin Pop-Up Flap Decal	52-0044-00	C-50	29	62-0014-03	Hobbit Steel Ramp Decal, Upper Left Side, Right	52-0042-00	C-48
10	62-0011-10	Hobbit Orc Pop-Up Flap Decal	52-0044-01	C-50	30	62-0014-04	Hobbit Steel Ramp Decal, Upper Right Side	52-0042-00	C-48
11	62-0011-11	Hobbit Spider Pop-Up Flap Decal	52-0044-03	C-50	31	62-0014-05	Hobbit Steel Ramp Decal, Inside Loop, Left	52-0042-00	C-48
12	62-0011-12	Hobbit Warg Pop-Up Flap Decal	52-0044-02	C-50	32	62-0014-06	Hobbit Steel Ramp Decal, Inside Loop, Right	52-0042-00	C-48
13	62-0011-13	Hobbit Coin Door Decal	40-0001-00	-	33	62-0018-00	Hobbit Back Panel Decal, Right Side	51-5031-00	C-42
14	62-0011-14	Hobbit Shooter Gauge Decal	52-0037-00	C-43	34	62-0018-01	Hobbit Back Panel Decal, Left Side	51-5031-00	C-42
15	62-0011-15	Hobbit ELF Drop Tgt Decal	51-0015-01	C-26	35	62-0019-00	Hobbit Clear Mylar Pop Bumper Area Protector	-	-
16	62-0011-16	Hobbit ELF Drop Tgt Decal	51-0015-01	C-26	36	62-0019-01	Hobbit Clear Mylar Captive Ball Area Protector	-	-
17	62-0011-17	Hobbit ELF Drop Tgt Decal	51-0015-01	C-26	37	62-0019-02	Hobbit Clear Mylar Slingshot Area Protector	-	-
18	62-0011-18	Hobbit DWARF Drop Tgt Decal	51-0017-00	C-28	38	62-0019-03	Hobbit Clear Mylar Ball Drop Protector	-	-
19	62-0011-19	Hobbit DWARF Drop Tgt Decal	51-0017-00	C-28	39	62-0019-04	Hobbit Clear Mylar Orc Pop-up Area Protector	-	-
20	62-0011-20	Hobbit DWARF Drop Tgt Decal	51-0017-00	C-28	40	62-0019-05	Hobbit Clear Mylar Lower Pop-up Area Protector	-	-
21	62-0011-21	Hobbit DWARF Drop Tgt Decal	51-0017-00	C-28	41	62-0019-07	Hobbit Clear Mylar Goblin Pop-up Area Protector	-	-
22	62-0011-22	Hobbit DWARF Drop Tgt Decal	51-0017-00	C-28	42	62-0020-00	Hobbit Clear Mylar Pop-Up Top Edge Protector	-	-



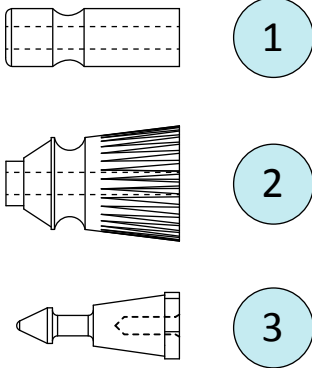
Rubber Rings, Bumpers & Sleeves

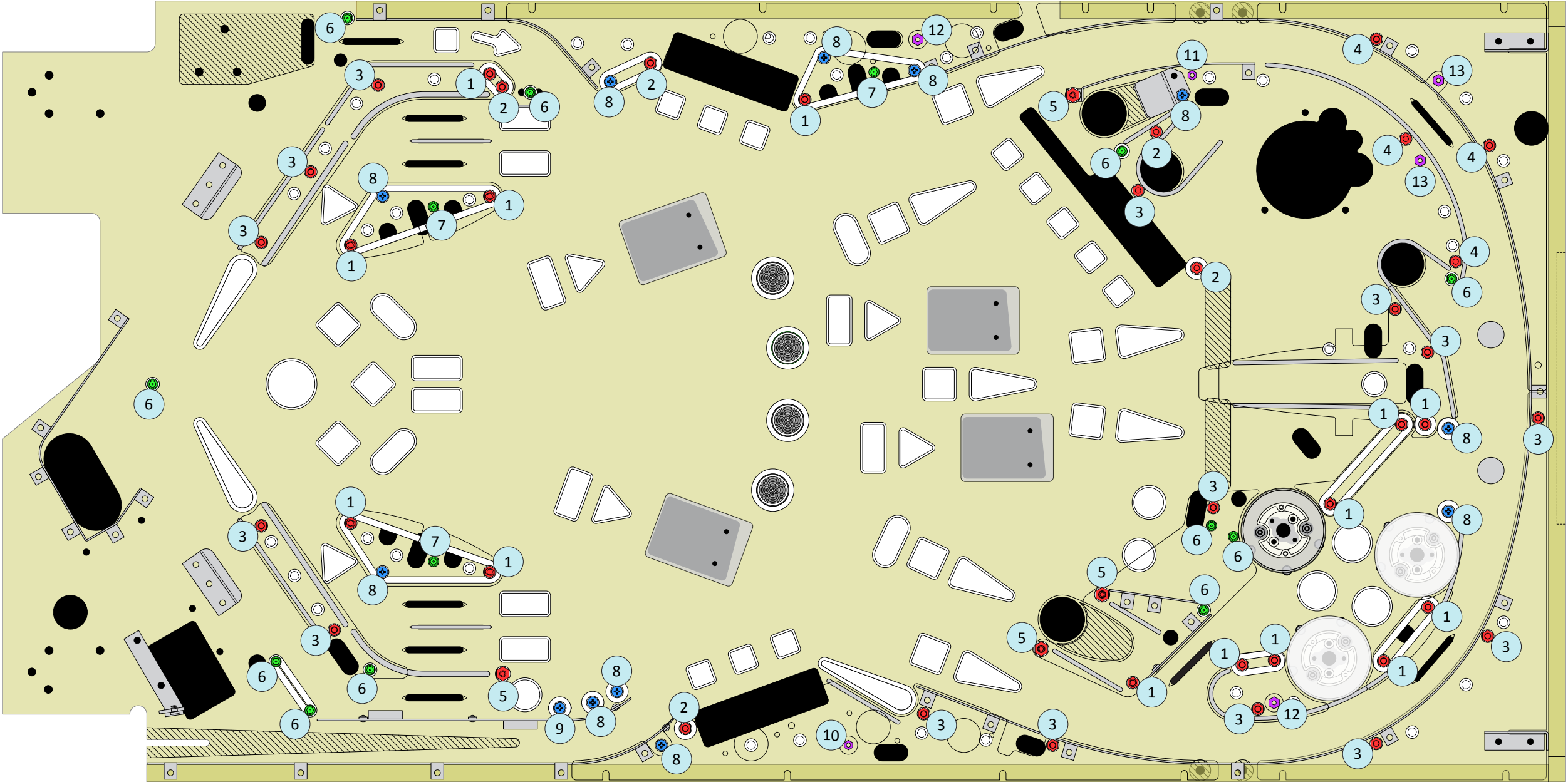
Item	Part Number	Description	Qty
1	25-2004-07-9	Silicone Ring, 7/16", White	1
	BA 25-2003-07-0	Rubber Ring, 7/16", Black	1
2	25-2004-12-9	Silicone Ring, 3/4", White	3
	BA 25-2003-12-0	Rubber Ring, 3/4", Black	3
3	25-2004-16-9	Silicone Ring, 1", White	1
	BA 25-2003-16-0	Rubber Ring, 1", Black	1
4	25-2004-24-9	Silicone Ring, 1-1/2", White	1
	BA 25-2003-24-0	Rubber Ring, 1-1/2", Black	1
5	25-2004-32-9	Silicone Ring, 2", White	1
	BA 25-2003-32-0	Rubber Ring, 2", Black	1
6	25-2004-40-9	Silicone Ring, 2-1/2", White	2
	BA 25-2003-40-0	Rubber Ring, 2-1/2", Black	2
7	25-6002-00	Post Rubber Sleeve, 1-1/16", Black	4
8	25-6005-03-9	3/16" ID Mini Post Silicone, White	9
	BA 25-6003-03-0	3/16" ID Mini Post Rubber, Black	9
9	25-6006-03-9	7/16" OD Post Silicone, White	9
	BA 25-6003-07-0	7/16" OD Post Rubber, Black	9
10	25-2001-02	Flipper Rubber Ring, 1-1/2", Red	3
	BA 25-2001-00	Flipper Rubber Ring, 1-1/2", Black	3



Plastic Playfield Posts

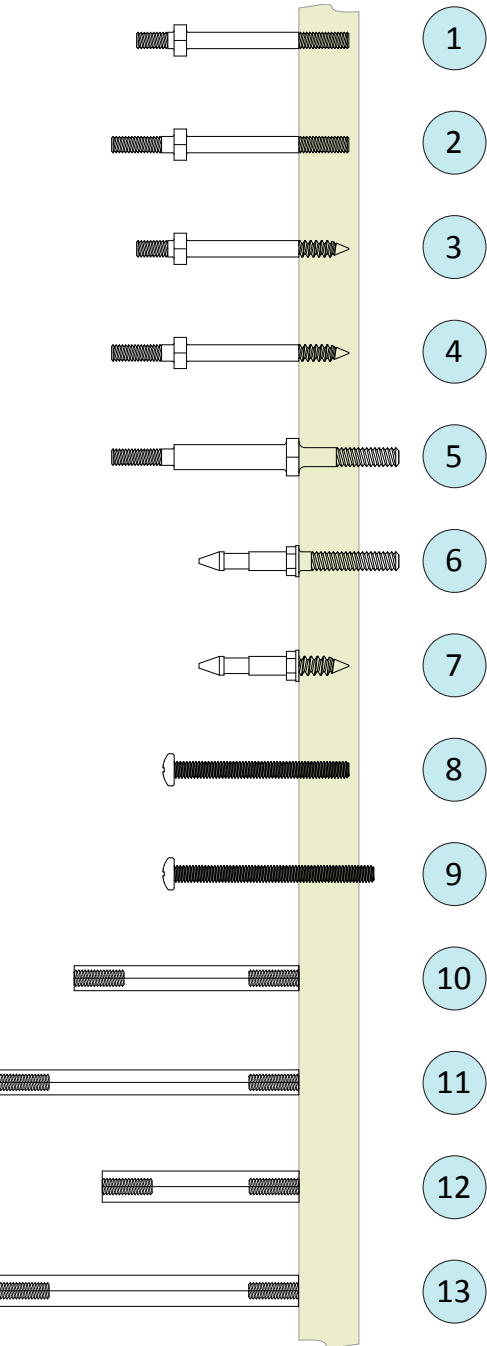
Item	Part Number	Description	Qty
1	30-9004-12	1-1/16" Standard Poly Post, Clear	50
2	30-9005-04	Single Star Poly Post, Yellow	1
3	30-9007-04	Mini Poly Post, Yellow	1

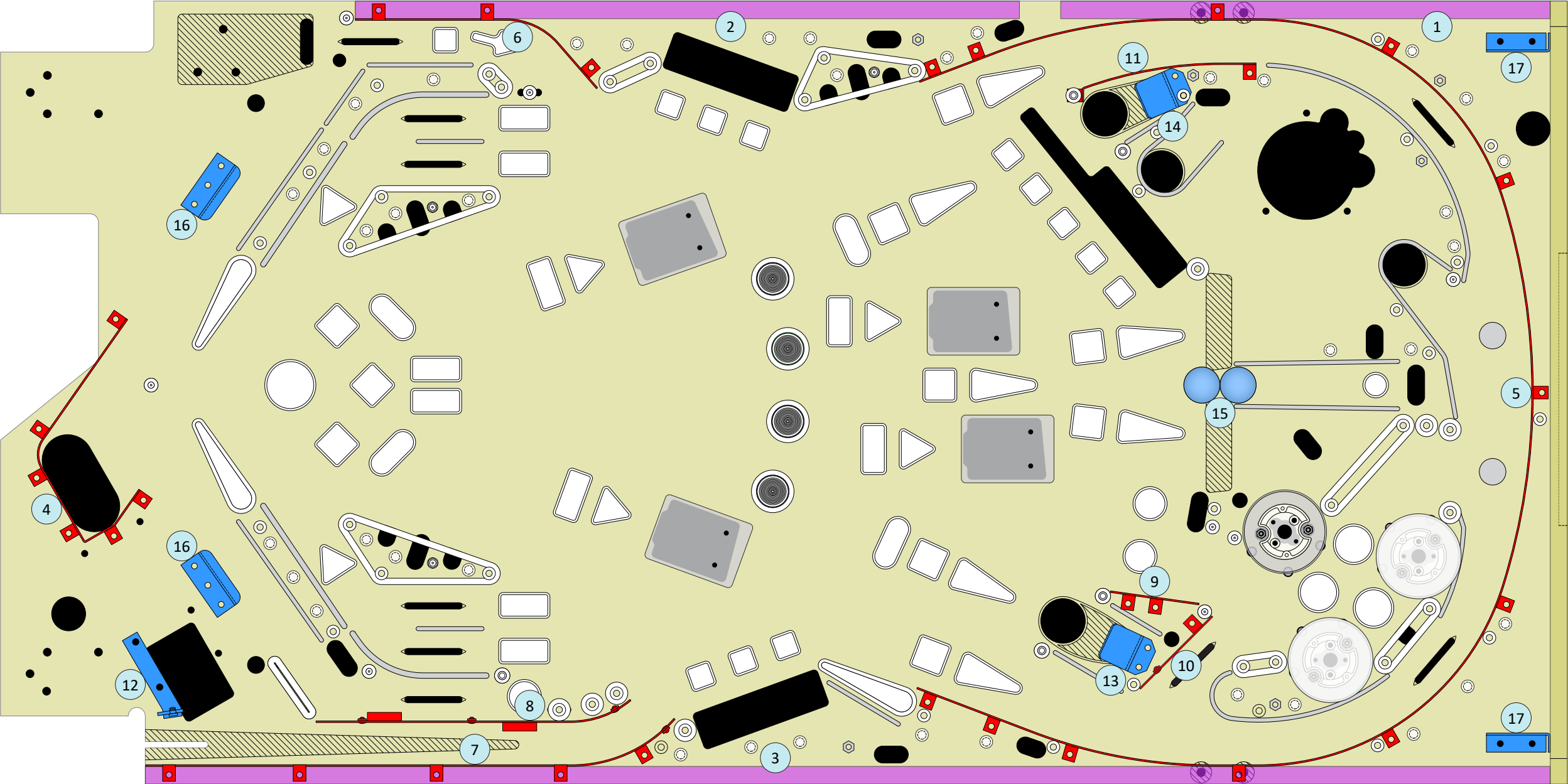




Metal Playfield Posts, Screws & Hex Spacers

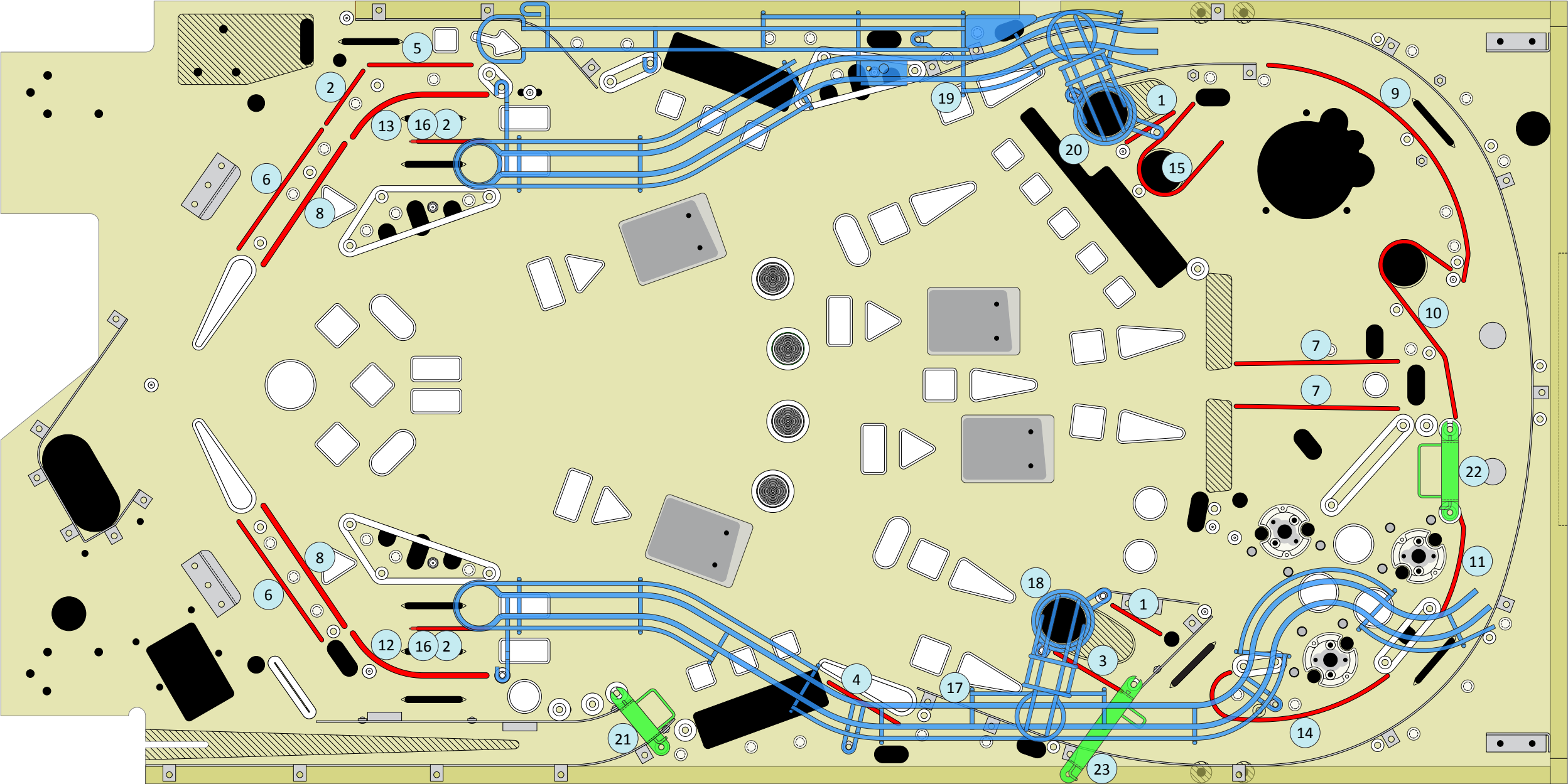
Item	Part Number	Description	Qty
1	97-0008-00	8-32/8-32 Butyrate Fastener Post, 2-1/8"	14
2	97-0008-01	8-32/8-32 Ramp Fastener Post, 2-3/8"	5
3	97-0008-02	8-32/WS Butyrate Fastener Post, 2-1/8"	15
4	97-0008-03	8-32/WS Ramp Fastener Post, 2-3/8"	4
5	97-0009-02	5/16" Hex Sleeve Ramp Fastener Post, 2-7/8"	4
6	97-0010-00	Steel Mini Post, 10-32, 2"	11
7	97-0010-02	Steel Mini Post, #10, WS, 1-1/2"	3
8	80-0008-28	8-32 x 1-3/4" PPH MS	11
9	80-0008-32	8-32 x 2" PPH MS	1
10	94-1408-36	1/4" x 2-1/4" Hex Spacer, F-F, 8-32, Zinc	1
11	94-1408-48	1/4" x 3" Hex Spacer, F-F, 8-32, Zinc	1
12	95-1508-32	5/16" x 2" Hex Spacer, F-F, 8-32, Zinc	2
13	95-1508-48	5/16" x 3" Hex Spacer, F-F, 8-32, Zinc	2





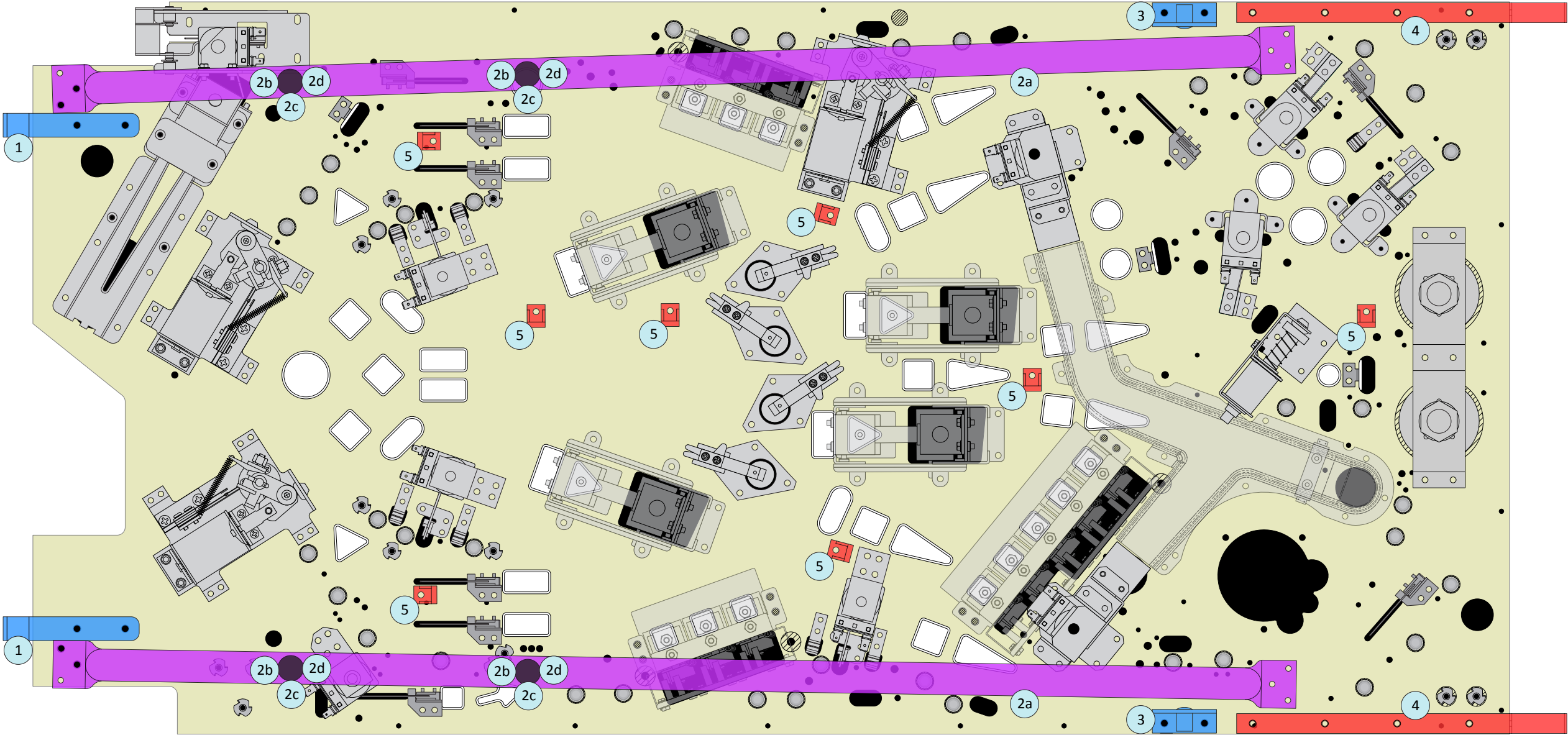
Woodrails, Flatrails, Brackets & Ball Deflectors

Item	Part Number	Description	Qty
1	05-8001-03	Hobbit Left Side Woodrail, Upper, 14.5"	1
2	05-8001-04	Hobbit Left Side Woodrail, Lower, 19.44"	1
3	05-8001-05	Hobbit Right Side Woodrail, 41.25"	1
4	12-0016-01	Ball Outhole Flatrail, Extended	1
5	12-0032-00	Hobbit Main Loop Flatrail	1
6	12-0033-01	Hobbit Left Outlane Flatrail	1
7	12-0034-00	Hobbit Outer Shooter Lane Flatrail	1
8	12-0035-00	Hobbit Inner Shooter Lane Flatrail	1
9	12-0036-00	Hobbit Pop Bumper Entrance Flatrail	1
10	12-0037-00	Hobbit Pop Bumper Exit Flatrail	1
11	12-0038-00	Hobbit Balin VUK Entrance Flatrail	1
12	10-0111-00	Ball Stop Brkt	1
13	51-0052-00	Snubber Brkt w/ Bumper Assy	1
	a) 10-3001-02	Snubber Brkt w/ Bumper Hole	1
	b) 25-9001-01	Ball Trough Bumper Plug, Blue	1
14	10-3001-00	Snubber Brkt	1
15	51-0054-00	Newton Ball Assy, 1-1/16"	1
	a) 00-0002-00	Newton Ball, 1-1/16"	1
	b) 00-0001-00	Mirror-Finish Pinball, Steel, 1-1/16"	1
16	10-0092-00	Bottom Arch Retainer Brkt, Black	2
17	10-0162-00	Back Panel Support Brkt	2



Ball Guide Rails, Wire Ramps & Ball Gates

Item	Part Number	Description	Qty	Item	Part Number	Description	Qty
1	13-3000-05	1.63" Straight Ball Guide Rail, Mini	2	16	13-3010-00	Wire Lane Divider (above item #2)	2
2	13-3000-07	1.88" Straight Ball Guide Rail, Mini (beneath item #16)	3	17	13-0007-01	Hobbit Right Wire Ramp, Chrome	1
3	13-3000-10	2.25" Straight Ball Guide Rail, Mini	1	18	13-0009-01	Hobbit Radagast VUK Wireform, Chrome	1
4	13-3000-11	2.38" Straight Ball Guide Rail, Mini	1	19	13-0008-01	Hobbit Left Wire Ramp, Chrome	1
5	13-3000-16	3.0" Straight Ball Guide Rail, Mini	1	20	13-0010-01	Hobbit Balin VUK Wireform, Chrome	1
6	13-3000-26	4.25" Straight Ball Guide Rail, Mini	2	21	51-0050-00	One Way Gate Assy, 2.42"	1
7	13-3000-30	4.75" Straight Ball Guide Rail, Mini	2	a)	10-0150-00	One Way Gate Brkt, 2.42"	1
8	13-3014-26	4.25" Straight Ball Guide Rail	2	b)	13-3022-00	One Way Gate Wireform, 1.61"	1
9	13-3016-00	Hobbit Left Orbit, High Ball Guide Rail	1	22	51-0051-00	One Way Gate Assy, 2.92"	1
10	13-3017-00	Hobbit Top Hole Entrance Ball Guide Rail	1	a)	10-0150-01	One Way Gate Brkt, 2.92"	1
11	13-3018-00	Hobbit Right Orbit, High Ball Guide Rail	1	b)	13-3022-01	One Way Gate Wireform, 2.11"	1
12	13-3021-00	Hobbit Right Return Lane Ball Guide Rail	1	23	51-0070-00	Ball Settling Gate Assy	1
13	13-3021-01	Hobbit Left Return Lane Ball Guide Rail	1	a)	10-0150-02	One Way Gate Brkt, 3.75"	1
14	13-3024-00	Hobbit Right Orbit, Low Ball Guide Rail	1	b)	13-3027-00	Ball Settling Gate Wireform	1
15	13-3026-00	Hobbit Smaug Release Ball Guide Rail	1				



Under-Playfield Supports & Brackets

Item	Part Number	Description	Qty
1	10-0014-00	Playfield Hanger Brkt	2
2	51-5030-01	Playfield Support Tube Assy	2
a)	10-0093-00	Playfield Support Tube	2
b)	80-7010-24	10-24 x 1-1/2" Phillips TH MS	4
c)	91-0011-00	10-24 Nylon Stop Nut	4
d)	25-9008-00	Playfield Support Rubber Spacer	4
3	11-7001-00	Playfield Hinge Brkt Assy, 1/15	2
4	10-0013-01	Playfield Lift Support Brkt, 10.3"	2
5	30-0033-01	Nylon Cable Ladder, 3.5"	8

Assembly Mounting Hardware

Assembly				Mounting Hardware		
Part Number	Name	Mounts To	Drawing	Part Number	Description	Qty
51-5010-01	Backbox Speaker Bar Assy	Backbox, Through	C-4	92-0010-00	#10 Flat Washer	5
10-0003-00	Cabinet Vent Hole Grill, 2-3/8" x 22"	Backbox, Interior	C-4	80-8110-10	10-32 x 5/8" TP Torx MS	5
51-5011-00	Backbox Light Bar Assy	Backbox, Interior	C-4	82-2008-08	#8 x 1/2" HWH Phillips SMS	8
51-5032-00	27" LCD Monitor Assy	Backbox, Interior	C-4	82-2008-08	#8 x 1/2" HWH Phillips SMS	3
10-0034-00	Backbox L Brkt, Lower (2)	Backbox, Interior	C-4	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	4
42-5002-00	Roto-Lock Receptacle	Backbox, Through	C-4	80-2025-08	1/4-20 x 1/2" HWH Phillips MS, Serrated	4
				91-5025-00	1/4-20 Hex Drive Flanged Insert	4
				91-0011-00	10-24 Lock Nut	2
				92-0010-00	#10 Flat Washer	2
				81-5011-28	10-24 x 1-3/4" Black Carriage Bolt	2
51-0032-01	Knocker Assy, Vertical	Backbox, Interior	C-4	82-2008-08	#8 x 1/2" HWH Phillips SMS	5
42-5001-00	Roto-Lock Latch	Cabinet, Through	C-2	91-0011-00	10-24 Lock Nut	2
				92-0010-00	#10 Flat Washer	2
				81-5011-28	10-24 x 1-3/4" Black Carriage Bolt	2
10-0186-00	Jack In The Back Cover Plate	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	4
51-5023-00	Line Filter Box Assy	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	4
10-0010-00	Line Cord Cover Plate	Cabinet, Exterior	C-2	80-2008-16	8-32 x 1" HWH Phillips MS, Serrated	2
10-0006-00	Cabinet Leg Mtg Brkt (4)	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	24
10-0133-00	Cabinet Leg Brkt, Decal Protector (4)	Cabinet, Exterior	C-2	82-6006-08	#6 x 1/2" PFH SMS, w/Undercut	8
10-0001-02	Cabinet Leg Assy, Chrome (4)	Cabinet, Through	C-2	90-8038-40	Leg Bolt, Acorn Head, 3/8-16 x 2-3/4"	8
10-0001-0X	Cabinet Leg Assy, (Powder Coated, 4)	Cabinet, Through	C-2	90-8038-40-0	Leg Bolt, Acorn Head, 3/8-16 x 2-3/4", Black	8
16-5000-01	Main Transformer, 10/13	Cabinet, Interior	C-2	80-2025-08	1/4-20 x 1/2" HWH Phillips MS, Serrated	4
				92-0025-00	1/4" Flat Washer	4
				91-4025-00	1/4-20 T-Nut, 1/2" Diameter	4
18-0005-01	Flipper Switch, Double Contact (Right)	Cabinet, Interior	C-2	82-2006-20	#6 x 1-1/4" HWH SMS	2
18-0005-00	Flipper Switch, Single Contact (Left)	Cabinet, Interior	C-2	82-2006-20	#6 x 1-1/4" HWH SMS	2
51-5027-01	Shaker Motor Assy	Cabinet, Interior	C-2	80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	4
				91-4008-00	8-32 T-Nut, 1/2" Diameter	4
51-0028-00	Plumb Bob Tilt Assy	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	4

Assembly				Mounting Hardware		
Part Number	Name	Mounts To	Drawing	Part Number	Description	Qty
51-0031-0X	Ball Shooter Assy (All Finishes)	Cabinet, Through	C-2	80-2010-08	10-32 x 1/2" HWH Phillips MS, Serrated	3
51-0035-00	Door & Interlock Switch Assy	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	2
40-000#-00	Coin Door Assy	Cabinet, Through	C-2	81-5125-20	1/4-20 x 1-1/4" Carriage Bolt, Black	4
				91-2025-00	1/4-20 flange Nut	4
10-0185-0#	PF Support/Slide Brkt, w/Bearing (2)	Cabinet, Interior	C-2	80-2010-08	10-32 x 1/2" HWH Phillips MS, Serrated	8
				91-5010-00	10-32 Hex Drive Flanged Insert	8
10-8001-00	Lockdown Bar Receiver Assy, Notched	Cabinet, Through	C-2	81-5125-20	1/4-20 x 1-1/4" Carriage Bolt, Black	2
				91-2025-00	1/4-20 flange Nut	2
				82-2008-08	#8 x 1/2" HWH Phillips SMS	2
42-7003-0#	Cabinet Side Rail (2)	Cabinet, Through	C-2	81-5108-16	8-32 x 1" Carriage Bolt, Black	4
				92-0008-00	#8 Flat Washer	4
				91-1008-00	8-32 Keps Nut	4
51-5001-00	Power Box Assy	Cabinet, Interior	C-2	82-2008-08	#8 x 1/2" HWH Phillips SMS	4
17-6002-00	Subwoofer Speaker, 4Ω	Cabinet, Interior	C-2	80-2008-16	8-32 x 1" HWH Phillips MS, Serrated	4
				91-4008-00	8-32 T-Nut, 1/2" Diameter	4
52-0037-00	Hobbit Bottom Arch Assy	Playfield, Top	C-6	82-2008-08	#8 x 1/2" HWH Phillips SMS	6
				80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	2
13-2002-02	Hobbit Left Wire Ramp Assy, Chrome	Playfield, Top	C-6	92-0008-00	#8 Flat Washer	4
				91-0008-00	8-32 Nylon Stop Nut	2
				80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	1
				97-0010-02	Steel Mini Post, #10, WS, 1-1/2"	1
13-0007-01	Hobbit Right Wire Ramp, Chrome	Playfield, Top	C-112	92-0008-00	#8 Flat Washer	4
				91-0008-00	8-32 Nylon Stop Nut	1
				80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	2
13-0009-01	Hobbit Radagast VUK Wireform, Chrome	Playfield, Top	C-112	92-0008-00	#8 Flat Washer	4
				91-0008-00	8-32 Nylon Stop Nut	2
13-0010-01	Hobbit Balin VUK Wireform, Chrome	Playfield, Top	C-112	92-0008-00	#8 Flat Washer	4
				91-0008-00	8-32 Nylon Stop Nut	2
18-7002-01	Right Opto Spinner Assy	Playfield, Top	C-6	82-2008-08	#8 x 1/2" HWH Phillips SMS	2
18-7002-02	Left Opto Spinner Assy	Playfield, Top	C-6	82-2008-08	#8 x 1/2" HWH Phillips SMS	2

Assembly				Mounting Hardware		
Part Number	Name	Mounts To	Drawing	Part Number	Description	Qty
52-0038-0X	Hobbit Smaug Assy	Playfield, Through	C-6	80-2008-16	8-32 x 1" HWH Phillips MS, Serrated	3
52-0042-00	Hobbit Steel Ramp Assy	Playfield, Top	C-6	80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	2
				82-6104-10	#4 x 5/8" PFH SMS, w/Undercut, Black	4
				80-0004-04	4-40 x 1/4" PPH MS	4
				82-0004-06	#4 x 3/8" PPH SMS	4
15-0029-0X	RGB LED Double Bd (Ramp back lights, 2)	Playfield, Top	C-64	10-0180-00	RGB LED Double Mtg Brkt, 45 deg	2
51-0025-00	Kickback Assy, Left Mount	Playfield, Top	C-6	82-2008-08	#8 x 1/2" HWH Phillips SMS	3
51-0071-00	Playfield Opto Pair Assy	Playfield, Top	C-6	82-2008-08	#8 x 1/2" HWH Phillips SMS	4
51-5031-00	Hobbit Back Panel Assy	Playfield, Top	C-6	82-2008-10	#8 x 5/8" HWH Phillips SMS	4
				82-6006-20	#6 x 1-1/4" PFH SMS, w/Undercut	4
52-0045-00	Hobbit Book LCD Assy	Playfield, Top	C-6	91-0008-00	8-32 Nylon Stop Nut	1
				80-2008-08	8-32 x 1/2" HWH Phillips MS, Serrated	1
51-0006-09	Pop Bumper Top Assy, White (3)	Playfield, Top	C-6	82-6006-14	#6 x 7/8" PFH SMS, w/Undercut	6
51-0050-00	One Way Gate Assy, 2.42"	Playfield, Top	C-112	91-0008-00	8-32 Nylon Stop Nut	2
51-0051-00	One Way Gate Assy, 2.92"	Playfield, Top	C-112	91-0008-00	8-32 Nylon Stop Nut	2
51-0070-00	Ball Settling Gate Assy	Playfield, Top	C-112	91-0008-00	8-32 Nylon Stop Nut	1
				82-2008-08	#8 x 1/2" HWH Phillips SMS	1
10-3001-00	Snubber Brkt	Playfield, Top	C-110	80-0008-28	8-32 x 1-3/4" PPH MS	1
				30-9004-12	1-1/16" Standard Poly Post, Clear	1
				80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	1
51-0052-00	Snubber Brkt w/ Bumper Assy	Playfield, Top	C-110	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	2
51-0054-00	Newton Ball Assy, 1-1/16"	Playfield, Top	C-110	92-0010-00	#10 Flat Washer	1
				91-0010-00	10-32 Nylon Stop Nut	1
10-0111-00	Ball Stop Brkt	Playfield, Top	C-110	82-2008-08	#8 x 1/2" HWH Phillips SMS	2
Various	Woodrails	Playfield, Top	C-110	82-6006-20	#6 x 1-1/4" PFH SMS, w/Undercut	12
Various	Flatrails	Playfield, Top, Through	C-110	82-2008-08	#8 x 1/2" HWH Phillips SMS	22
				82-7006-08	#6 x 1/2" TH Phillips SMS	8
				92-0008-00	#8 Flat Washer	5
				91-0008-00	8-32 Nylon Stop Nut	5

Assembly				Mounting Hardware		
Part Number	Name	Mounts To	Drawing	Part Number	Description	Qty
32-5003-00	Hobbit Smaug Front Gold Pile Assy	Playfield, Top	C-100	91-0008-00	8-32 Nylon Stop Nut	1
32-0032-00	Hobbit Upr Left Corner Gold Pile Sclptr	Playfield, Top	C-100	91-0008-00	8-32 Nylon Stop Nut	2
32-0036-00	Hobbit Smaug Rt Side Gold Pile Sclptr	Playfield, Top	C-100	91-0008-00	8-32 Nylon Stop Nut	2
Various	Printed Playfield Plastics	Playfield, Top	C-96	82-7006-08	#6 x 1/2" TH Phillips SMS	10
				91-0008-00	8-32 Nylon Stop Nut	25
Various	Clear Playfield Plastics	Playfield Plastics	C-98	25-9005-08	1/2" DN Rubber Post	7
30-0076-04	Mini Flasher Dome w/Tabs, Yellow	Playfield Plastics	C-98	30-0177-00	Flasher/GI Mtg Brkt, Clear Plastic	7
				30-0041-02	Push Rivet, Click-Lock, 0.217-0.256"	14
11-5004-01	Pop Bumper Ring & Rod Assy	Playfield, Through	C-6	91-0006-00	6-32 Nylon Stop Nut	2
51-0068-00	Upper Jump Bumper Barrel Assy	Playfield, Through	C-6	91-0006-00	6-32 Nylon Stop Nut	2
51-0069-00	Right Jump Bumper Barrel Assy	Playfield, Through	C-6	91-0006-00	6-32 Nylon Stop Nut	2
31-5011-00	Hobbit Subway Assy	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	12
18-7003-00	Rollover Button Switch Assy (4)	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	12
51-0001-00	Right Flipper Assy	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	8
51-0001-13	Right Flipper Assy, Mod-LL	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	6
51-0002-00	Left Flipper Assy	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	8
51-0003-0X	Slingshot Assy (3)	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	33
51-0004-01	Pop Bumper Bottom Assy (3)	Playfield, Under	C-8	85-8006-20	6-32 x 1-1/4" Screw Nail, Fin Shank, Black	9
				91-0006-00	6-32 Nylon Stop Nut	9
				82-2008-08	#8 x 1/2" HWH Phillips SMS	6
51-0012-0X	VUK/Steel Trough Assy (2)	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	10
51-0015-0X	3-Bank Drop Target Assy (2)	Playfield, Under	C-8	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	8
				91-5008-00	8-32 Insert, Hex Drive, Flanged	8
51-0017-00	5-Bank Drop Target Assy	Playfield, Under	C-8	80-2008-06	8-32 x 3/8" HWH Phillips MS, Serrated	4
				91-5008-00	8-32 Insert, Hex Drive, Flanged	4
51-0021-00	5-Ball Trough Assy	Playfield, Under	C-8	80-2008-12	8-32 x 3/4" HWH Phillips MS, Serrated	6
				82-2008-08	#8 x 1/2" HWH Phillips SMS	2

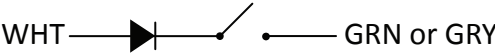
Assembly				Mounting Hardware		
Part Number	Name	Mounts To	Drawing	Part Number	Description	Qty
15-0007-00	Opto I/O Bd (3)	Playfield, Under	C-66	10-5020-00	Opto I/O PCB Mtg Brkt	3
15-0033-0X	BAG Controller PCB Assy	Playfield, Under	C-66	80-0004-10	4-40 x 5/8" PPH MS	12
				94-3005-00	#4 x 3/8" Nylon PCB Stand-Off	12
				10-5035-00	RGB LED Controller/BAG PCB Mtg Brkt	1
15-0031-0X	RGB LED Controller PCB Assy (3)	Playfield, Under	C-66	80-2104-06	4-40 x 3/8" HWH MS, Black	4
				82-2008-08	#8 x 1/2" HWH Phillips SMS	2
				10-5035-00	RGB LED Controller/BAG PCB Mtg Brkt	3
Various 15-0028-0X	RGB & GI LED Bds RGB LED Single Bd (LOCK rollovers, 4)	Playfield, Under	C-66	80-2104-06	4-40 x 3/8" HWH MS, Black	12
				94-3011-00	#4 x 1/8" Nylon Spacer, Stackable	12
				82-2008-08	#8 x 1/2" HWH Phillips SMS	6
15-0027-00	GI LED Bd (Pop-Up face accents, 4)	Playfield, Under	C-66	82-0004-06	#4 x 3/8" PPH SMS	111
				10-0155-00	RGB LED Single Mtg Brkt, Rollover Switch	4
				70-9010-00	RGB LED Bd Insulator, Fish Paper	4
51-0026-00	Auto-Launch Assy	Playfield, Under	C-8	80-2104-06	4-40 x 3/8" HWH MS, Black	8
				82-2008-08	#8 x 1/2" HWH Phillips SMS	8
				10-0179-00	Flasher/GI Mtg Brkt, 45 deg	4
51-0030-00	Disappearing Post assy	Playfield, Under	C-8	80-0004-04	4-40 x 1/4" PPH MS	4
51-0046-00	Dual Magnet Assy	Playfield, Under	C-8	82-0004-06	#4 x 3/8" PPH SMS	8
51-0048-00	Subway Diverter Assy	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	3
52-0044-0X	Hobbit Pop-Up Assy (4)	Playfield, Under	C-8	82-2008-08	#8 x 1/2" HWH Phillips SMS	4
51-5030-01	Playfield Support Tube Assy (2)	Playfield, Under	C-114	82-2008-08	#8 x 1/2" HWH Phillips SMS	6
10-0014-00	Playfield Hanger Brkt (2)	Playfield, Under	C-114	82-2008-08	#8 x 1/2" HWH Phillips SMS	20
11-7001-00	Playfield Hinge Brkt Assy, 1/15 (2)	Playfield, Under	C-114	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	6
10-0013-00	Playfield Lift Support Brkt, 10.3" (2)	Playfield, Under	C-114	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	4
30-0033-01	Nylon Cable Ladder, 3.5" (8)	Playfield, Under	C-114	80-2008-10	8-32 x 5/8" HWH Phillips MS, Serrated	4
				82-6104-10	#4 x 5/8" PFH SMS, w/Undercut, Black	8
				82-2008-08	#8 x 1/2" HWH Phillips SMS	8

Assembly Cables

Assembly		Cable	
Part Number	Name	Part Number	Description
51-5010-00	Backbox Speaker Bar Assy	19-3000-00	Speaker Box Cable Assy
51-5011-00	Backbox Light Bar Assy	19-3024-00	2-Wire RCA Cable, 10ft
51-5032-00	27" LCD Monitor Assy	19-3109-00	Backbox Light Cable
		19-3071-00	DVI-D Cable, M-M, 6ft
		19-3072-01	27" LCD Power Cable, Shielded
		19-3066-00	27" LCD Adjustment Keypad Cable
		19-3067-00	27" LCD LVDS Cable, 25cm
		19-3069-00	27" LCD Backlight Drvr Bd Input Cable, 13cm
		19-3070-00	27" LCD Backlight Drvr Bd Output Cable, 36cm
51-0032-01	Knocker Assy, Vertical	19-3104-00	Backbox Knocker Coil Cable
51-5023-00	Line Filter Box Assy	19-9004-00	Power Box AC Input Cable
18-0005-01	Flipper Leaf Switch, Double Contact (Right)	19-9000-00	Line Power Cable, USA
18-0005-00	Flipper Leaf Switch, Single Contact (Left)	19-3009-00	Right Flipper Switch cable
51-5027-01	Shaker Motor Assy	19-3009-01	Left Flipper Switch cable
51-5001-00	Power Box Assy	19-3006-00	Shaker Motor Cable
17-6002-00	Subwoofer Speaker, 4Ω	19-9004-00	Power Box AC Input Cable
Various	RGB LED Boards	19-3024-01	RCA Mono Cable, 1.5ft
Various	GI & Flasher LED Boards	Various	See RGB LED Wiring, pg C-72
10-8001-00	Lockdown Bar Receiver Assy, Notched	Various	See GI Lighting & Flasher Wiring, pg C-78
51-0012-00	VUK/Steel Trough Assy, Right (Radagast)	19-3107-05	Lockdown Bar Switch Cable, No Connector
51-0012-01	VUK/Steel Trough Assy, Right (Balin)	19-3073-00	Hobbit Radagast VUK Opto Switch Cable, BRN
51-0015-00	3-Bank Drop Tgt Assy, Right (MAN)	19-3073-01	Hobbit Balin VUK Opto Switch Cable, BLK
51-0015-01	3-Bank Drop Tgt Assy, Right (ELF)	19-3075-00	Hobbit Right 3-Bank Drop Tgt Coil Cable
51-0017-00	5-Bank Drop Tgt Assy (DWARF)	19-3076-00	Hobbit Left 3-Bank Drop Tgt Coil Cable
52-0038-0X	Smaug Assy	19-3077-00	Hobbit 5-Bank Drop Tgt Coil Cable
		19-3097-00	Smaug Eyes/Mouth Cable
		19-3102-00	Hobbit Smaug PCB Switch/Power Cable
		19-3101-00	Hobbit Smaug Stepper Motor Cable
51-5034-00	Ramp Hold Magnet Assy	19-3087-00	Ramp Hold Magnet Coil Cable
51-5035-00	Smaug Feed Diverter Assy	19-3088-00	Smaug Feed Diverter Coil Cable
51-5036-00	Ramp U-Turn Diverter Assy	19-3086-00	Ramp U-Turn Diverter Coil Cable

Assembly		Cable	
Part Number	Name	Part Number	Description
51-5038-00	Windlance Diverter Assy	19-3085-00	Windlance Diverter Coil Cable
52-0044-0X	Hobbit Pop-Up Assy	19-3080-00	Pop-up Character Hit Switch Cable
52-0045-00	Hobbit Book LCD Assy	19-3128-05	4.3" LCD VGA Ribbon Cable, 5"
		19-3025-00	VGA 15-pin Sub D Cable, 6ft
		19-9026-00	4.3" LCD Power Cable
15-5000-02	Cabinet PCB Chassis Assy, HOB	19-5007-00	I/O Bd Right-Side Cable Assy, 10/15
		19-5007-01	I/O Bd Left-Side Cable Assy, 10/15
		19-9005-02	I/O Bd AC Input Cable
		19-3042-03	Ethernet Cable, Cat5E, 3ft
		19-3043-00	3.5mm Audio Cable, 1.5ft
		19-3043-01	3.5mm Audio Cable, 3ft
		19-3047-01	SATA Hard Drive Cable
		19-9014-01	CPU Board Input Power Cable
		19-9014-02	CPU Board External Power Cable
		19-9015-01	Amp Board Input Power Cable
		19-9021-00	Chassis RGB LED Power Cable
		19-9022-00	Chassis Opto Power Cable
		19-3065-00	Chassis Fan Cable
		19-9018-01	I/O Board Switch Power Input Cable
		19-3074-00	USB Cable, 2.0 A to Mini-B, M-M, 3ft (2)
		19-3060-00	3-Wire RCA Cable, 1.5ft
50-5007-00	Lower Cabinet Assy	19-3059-00	USB 2.0 A Extension Cable, M-F, 6ft
		19-9020-00	Dollar Bill Acceptor Power Cable
		19-5008-00	Hobbit Cabinet Cable
		19-9009-01	Transformer Secondary Power Cable
		19-3063-00	Coin Door/Topper Y Power Cable
		19-3064-00	Left-Side Opto Board Power Cable
		19-3064-01	Right-Side Opto Board/Trough Y Power Cable
		19-5006-00	Hobbit Main Playfield Harness
		19-3051-00	Start Button Cable

Matrixed Switch Wiring Table



	Column 1		Column 2		Column 3		Column 4		Column 5		Column 6		Column 7		Column 8		Column 9		Column 10		Column 11		Column 12		Column 13		Column 14		Column 15		Column 16	
	J201-1		J201-2		J201-3		J201-4		J201-5		J201-6		J201-7		J201-9		J202-1		J202-2		J202-3		J202-4		J202-5		J202-6		J202-8		J202-9	
	GRN	BLK	GRN	BRN	GRN	RED	GRN	ORN	GRN	YEL	GRN	GRY	GRN	BLU	GRN	VIO	GRY	BLK	GRY	BRN	GRY	RED	GRY	ORN	GRY	YEL	GRY	GRN	GRY	BLU	GRY	VIO
Row 1 J200-1	1 5-Ball Trough #5 (Left)		9 Balin VUK		17 DWARF Drop Target		25 ELF Drop Target		33 Warg Pop-Up Hit		41 Gloin Target		49 Ori Target		57 Left Slingshot, High		65 Thorin Target (Captive)		73 Right Slingshot, High		81 Bifur Target		89		97		105		113		121	
WHT	BLK																															
Row 2 J200-2	2 5-Ball Trough #4		10 Radagast VUK		18 DWARF Drop Target		26 ELF Drop Target		34 Spider Pop-Up Hit		42 Oin Target		50 Dori Target		58 Left Slingshot, Low		66 Right Orbit		74 Right Slingshot, Low		82 Bofur Target		90		98		106		114		122	
WHT	BRN																															
Row 3 J200-3	3 5-Ball Trough #3		11 Gandalf Ramp Made		19 DWARF Drop Target		27 ELF Drop Target		35 Goblin Pop-Up Hit		43 Dwalin Target		51 Nori Target		59 Orc Return Lane		67 Upper Pop Bumper		75 Goblin Return Lane		83 Bombur Target		91		99		107		115		123	
WHT	RED																															
Row 4 J200-4	4 5-Ball Trough #2		12 Bilbo Ramp Made		20 DWARF Drop Target		28 Smaug Left Limit		36 Orc Pop-Up Hit		44 Warg Up		52		60 Warg Return Lane		68 Right Pop Bumper		76 Right Outlane (Gollum)		84 LOCK Rollover		92		100		108		116		124	
WHT	ORN																															
Row 5 J200-5	5 5-Ball Trough #1 (Right)		13 Bilbo Ramp Enter		21 DWARF Drop Target		29		37 Upper Slingshot, High		45 Spider Up		53 Left Orbit		61		69 Left Pop Bumper		77 Spider Return Lane		85 LOCK Rollover		93		101		109		117		125	
WHT	YEL																															
Row 6 J200-6	6 5-Ball Trough Jam		14 Gandalf Ramp Enter		22 MAN Drop Target		30 Smaug Right Limit		38 Upper Slingshot, Low		46 Goblin Up		54 Mystery Target		62 Left Outlane (Kickback)		70 Pop Bumper Exit Lane		78 Beorn Target		86 LOCK Rollover		94		102		110		118		126	
WHT	GRN																															
Row 7 J200-7	7		15 Subway Enter		23 MAN Drop Target		31 Kili Spinner		39		47 Orc Up		55		63		71 Pop Bumper Area Rubber		79 Shooter Lane		87 LOCK Rollover		95		103		111		119		127	
WHT	BLU																															
Row 8 J200-8	8		16 Fili Spinner		24 MAN Drop Target		32 Bag End		40		48		56		64		72		80		88		96		104		112		120		128	
WHT	VIO																															

 Opto Switches

70-Volt Coil Wiring Table

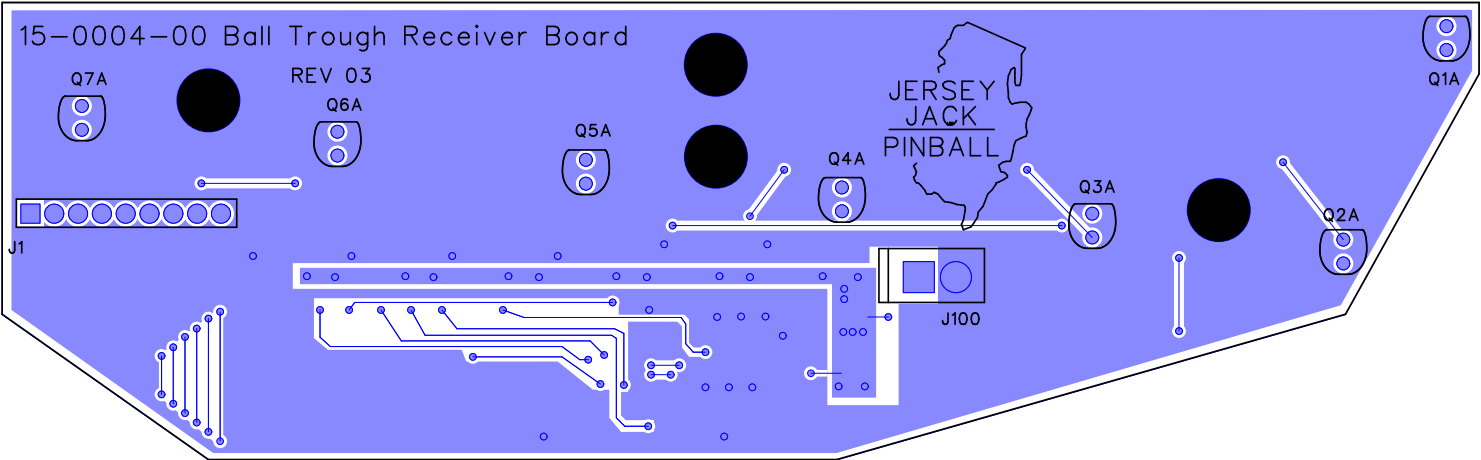
F701, 10A SB F704, 5A SB	Drive 1		Drive 2		Drive 3		Drive 4		Drive 5		Drive 6		Drive 7		Drive 8	
	J104-9, Q308		J104-8, Q307		J104-7, Q306		J104-6, Q305		J104-5, Q304		J104-4, Q303		J104-3, Q302		J104-2, Q301	
	70V Power	BRN	BLK	BRN	GRY	BRN	RED	BRN	ORN	BRN	YEL	BRN	GRN	BRN	BLU	BRN
J104-1	MAN Drop Target Reset (Up)		MAN Drop Target Reset (Up)		MAN Drop Target Reset (Up)		Right Flipper Power		Right Flipper Hold		Goblin Pop-Up Power		Goblin Pop-Up Hold		Ramp U-Turn Diverter	
BRN																
F701, 10A SB F705, 7A SB	Drive 9		Drive 10		Drive 11		Drive 12		Drive 13		Drive 14		Drive 15		Drive 16	
	J105-10, Q318		J105-8, Q317		J105-7, Q316		J105-6, Q315		J105-5, Q314		J105-4, Q313		J105-3, Q312		J105-2, Q311	
	70V Power	RED	BLK	RED	BRN	RED	GRY	RED	ORN	RED	YEL	RED	GRN	RED	BLU	RED
J105-1	ELF Drop Target Reset (Up)		ELF Drop Target Reset (Up)		ELF Drop Target Reset (Up)		Left Flipper Power		Left Flipper Hold		Orc Pop-Up Power		Orc Pop-Up Hold		Left Slingshot	
RED																
F701, 10A SB F706, 6.3A SB	Drive 17		Drive 18		Drive 19		Drive 20		Drive 21		Drive 22		Drive 23		Drive 24	
	J106-10, Q328		J106-9, Q327		J106-7, Q326		J106-6, Q325		J106-5, Q324		J106-4, Q323		J106-3, Q322		J106-2, Q321	
	70V Power	ORN	BLK	ORN	BRN	ORN	RED	ORN	GRY	ORN	YEL	ORN	GRN	ORN	BLU	ORN
J106-1	DWARF Drop Target Reset (Up)		DWARF Drop Target Reset (Up)		DWARF Drop Target Reset (Up)		DWARF Drop Target Reset (Up)		DWARF Drop Target Reset (Up)		Warg Pop-Up Power		Warg Pop-Up Hold		Right Slingshot	
ORN																
F702, 10A SB F707, 6.3A SB	Drive 25		Drive 26		Drive 27		Drive 28		Drive 29		Drive 30		Drive 31		Drive 32	
	J107-10, Q338		J107-9, Q337		J107-8, Q336		J107-6, Q335		J107-5, Q334		J107-4, Q333		J107-3, Q332		J107-2, Q331	
	70V Power	TAN	BLK	TAN	BRN	TAN	RED	TAN	ORN	TAN	YEL	TAN	GRN	TAN	BLU	TAN
J107-1	Upper Right Flipper Power		Upper Right Flipper Hold		Smaug Feed Diverter		Balin VUK		Ramp Hold Magnet		Spider Pop-Up Power		Spider Pop-Up Hold		Upper Slingshot	
TAN																
F702, 10A SB F708, 5A SB	Drive 33		Drive 34		Drive 35		Drive 36		Drive 37		Drive 38		Drive 39		Drive 40	
	J108-10, Q408		J108-9, Q407		J108-8, Q406		J108-7, Q405		J108-5, Q404		J108-4, Q403		J108-3, Q402		J108-2, Q401	
	70V Power	PNK	BLK	PNK	BRN	PNK	RED	PNK	ORN	PNK	YEL	PNK	GRN	PNK	BLU	PNK
J108-1	Left Pop Bumper		Right Pop Bumper		Upper Pop Bumper		Radagast VUK		Ball Auto-Launch		5-Ball Trough VUK		Windlance/ Kickback		Knocker	
PNK																



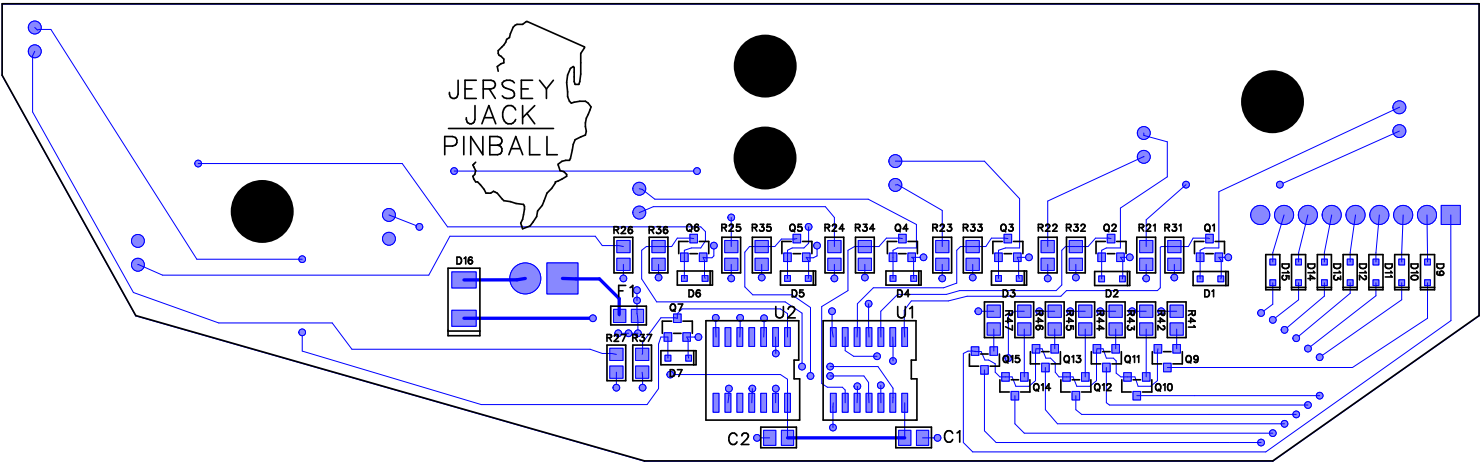
Section D

Reference Diagrams & Schematics



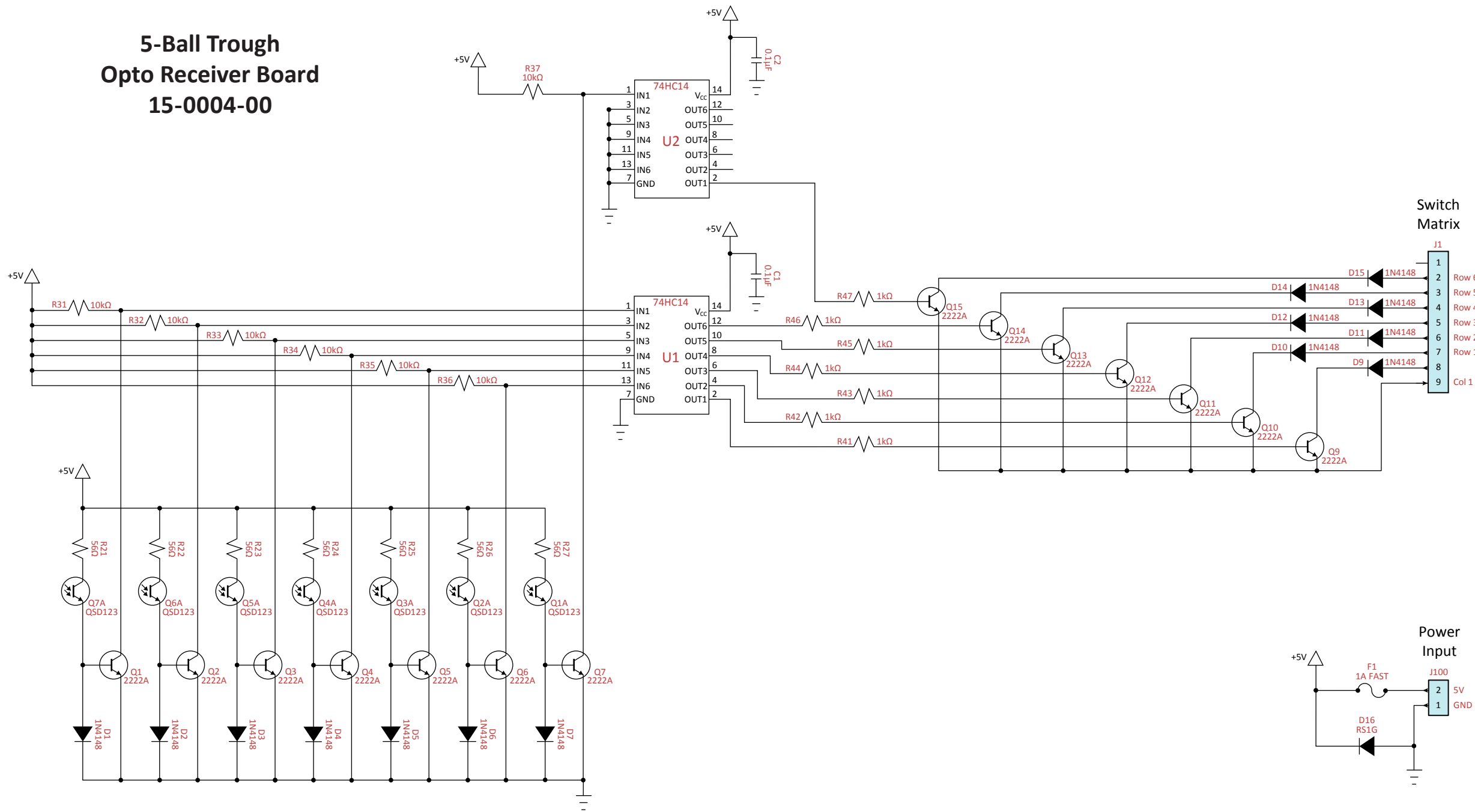


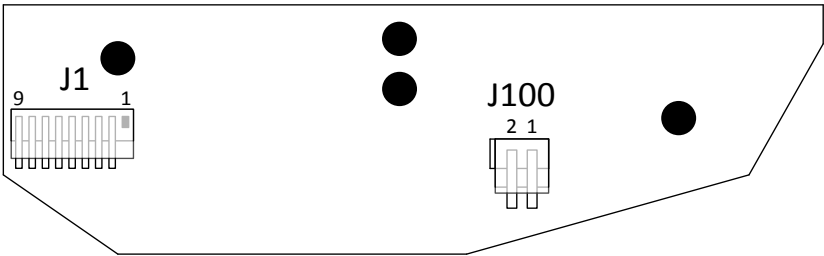
5-Ball Trough Opto Receiver Board
15-0004-00



Component(s)	Part Number	Description
C1, C2	100-104K-050	Capacitor, MLCC, 0805 SMT, 0.1µF, 50V, 10%
D1-D7, D9-D15	110-1000-0S	Diode, 1N4148, SMT, 75V, 300mA
D16	110-5001-0S	Diode, RS1G, SMT, 400V, 1A, 150ns
F1	170-3201-FS	Fuse, Fast, 0805 SMT, 1A, 32V
Q1-Q7, Q9-Q15	131-0000-0S	Transistor, 2222A, SOT-23 SMT, NPN
Q1A-Q7A	24-0003-0T	Phototransistor, IR, QSD123, 880nm, 5mm
R21-R27	120-0056-254	Resistor, 0805 SMT, 56Ω, 0.25W, 5%
R31-R37	120-10K0-254	Resistor, 0805 SMT, 10kΩ, 0.25W, 5%
R41-R47	120-1K00-254	Resistor, 0805 SMT, 1kΩ, 0.25W, 5%
U1, U2	141-0000-0S	Hex Inverters, Schmitt Trigger, 74HC14, SOT-108 SMT
J100	31-2500-02	Header, Male, 2-pin, Rt Angle, 3.96mm
J1	31-2501-09	Header, Male, 9-pin, Rt Angle, 2.54mm

5-Ball Trough
Opto Receiver Board
15-0004-00





5-Ball Trough Opto Receiver Board
15-0004-00
Connector Pin-outs

J1 *Matrixed Switches*

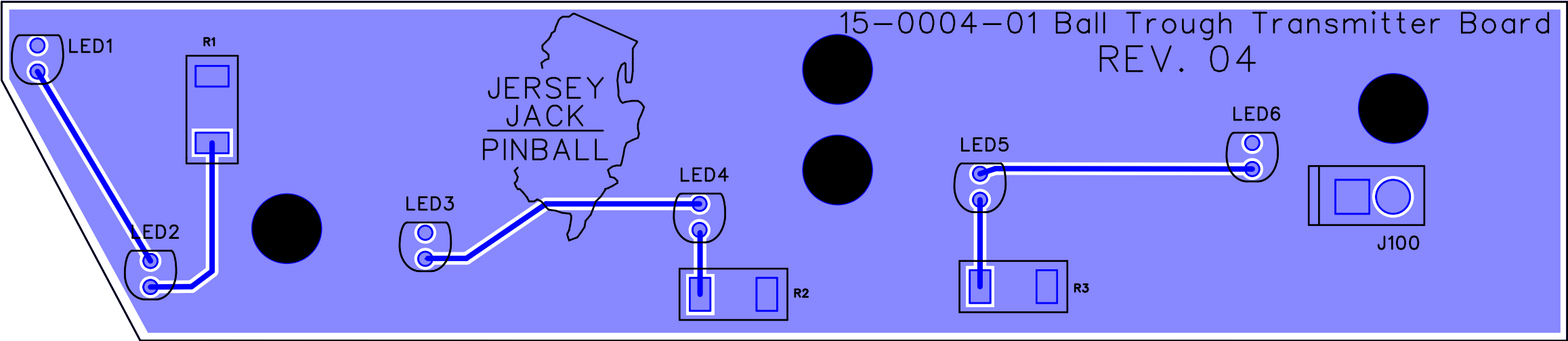
J1-1	GRN-BLK	Matrixed switches, Column 1 from I/O Board, J201-1
J1-2	Not Used	
J1-3	WHT-BLK	Matrixed switches, Row 1 from I/O Board, J200-1
J1-4	WHT-BRN	Matrixed switches, Row 2 from I/O Board J200-2
J1-5	WHT-RED	Matrixed switches, Row 3 from I/O Board J200-3
J1-6	WHT-ORN	Matrixed switches, Row 4 from I/O Board J200-4
J1-7	WHT-YEL	Matrixed switches, Row 5 from I/O Board J200-5
J1-8	WHT-GRN	Matrixed switches, Row 6 from I/O Board J200-6
J1-9	Key	

J100 *Power Input*

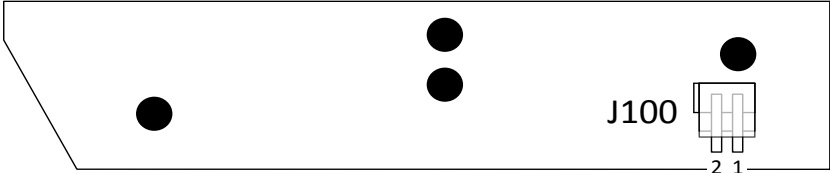
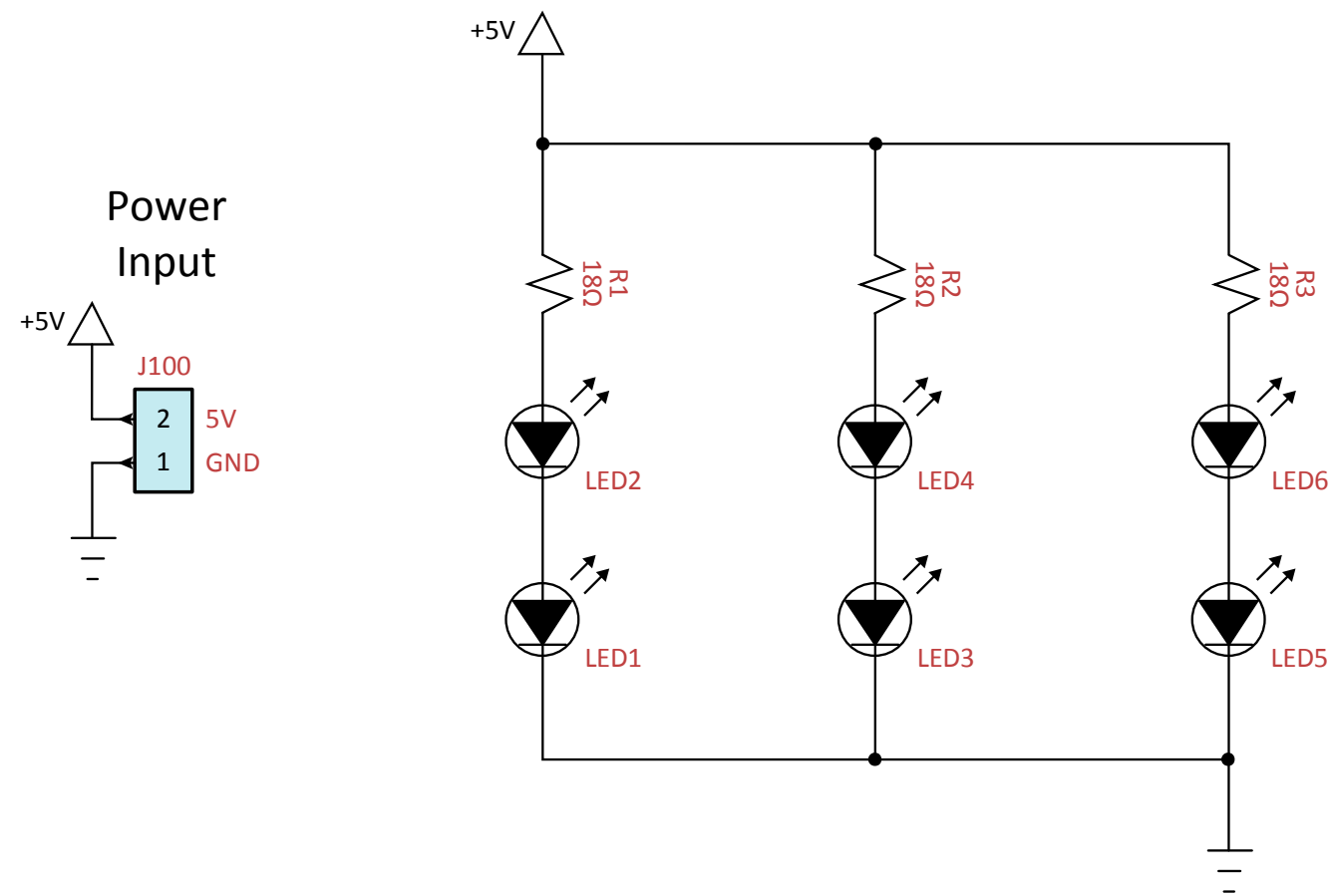
J100-1	RED	+5VDC from Primary ATX Pwr Supply
J100-2	BLK	Ground from Primary ATX Pwr Supply

5-Ball Trough Opto Transmitter Board
15-0004-01

Component(s)	Part Number	Description
LED1-LED6	24-0002-0T	LED, IR Emitting, QED123, 880nm, 5mm
R1-R3	123-0018-1H4	Resistor, 2512 SMT, 18Ω, 1W, 5%
J100	31-2500-02	Header, Male, 2-pin, Rt Angle, 3.96mm



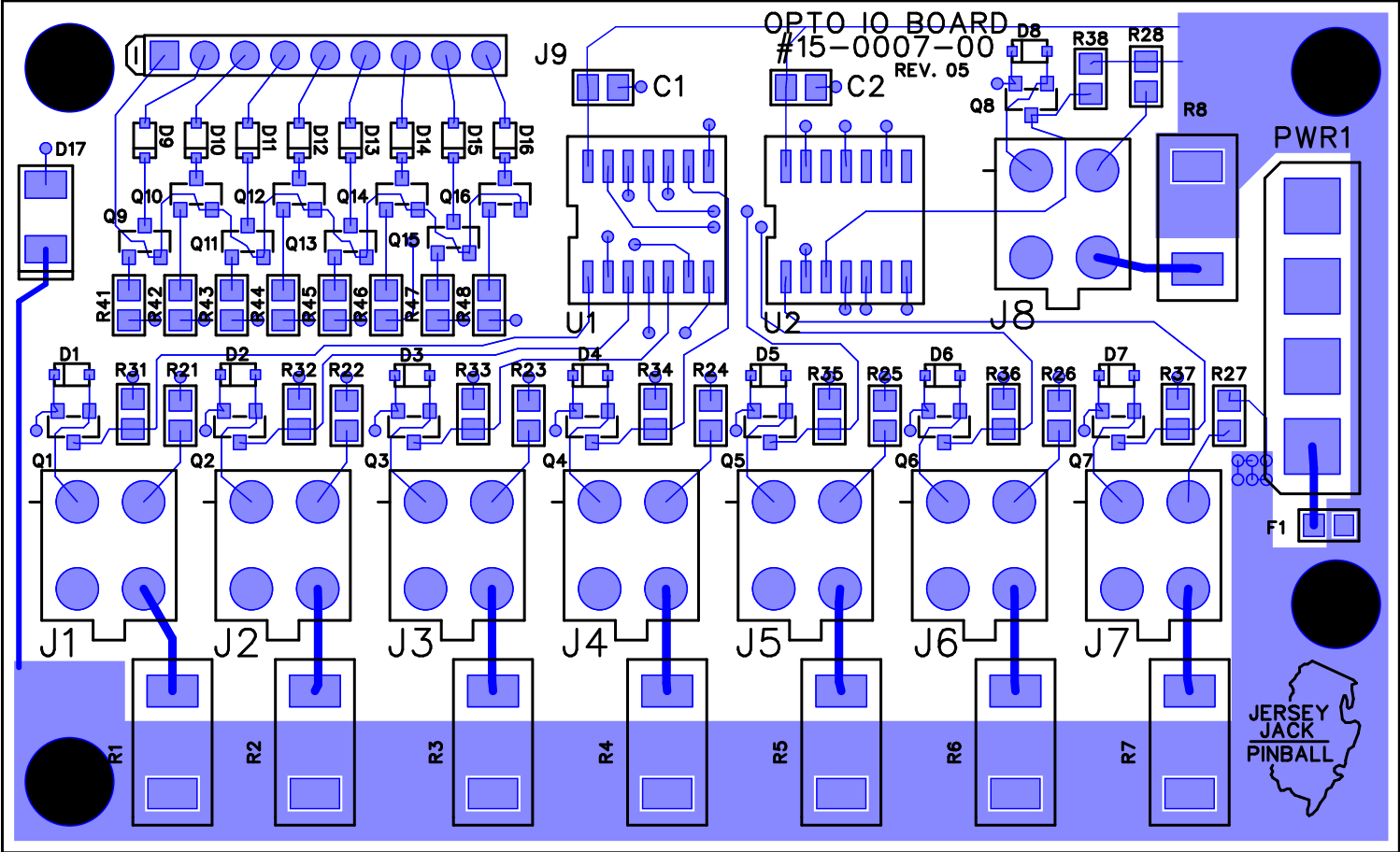
5-Ball Trough
Opto Transmitter Board
15-0004-01



5-Ball Trough Opto Transmitter Board
15-0004-01
Connector Pin-outs, *Revision 4*

J100 Power Input

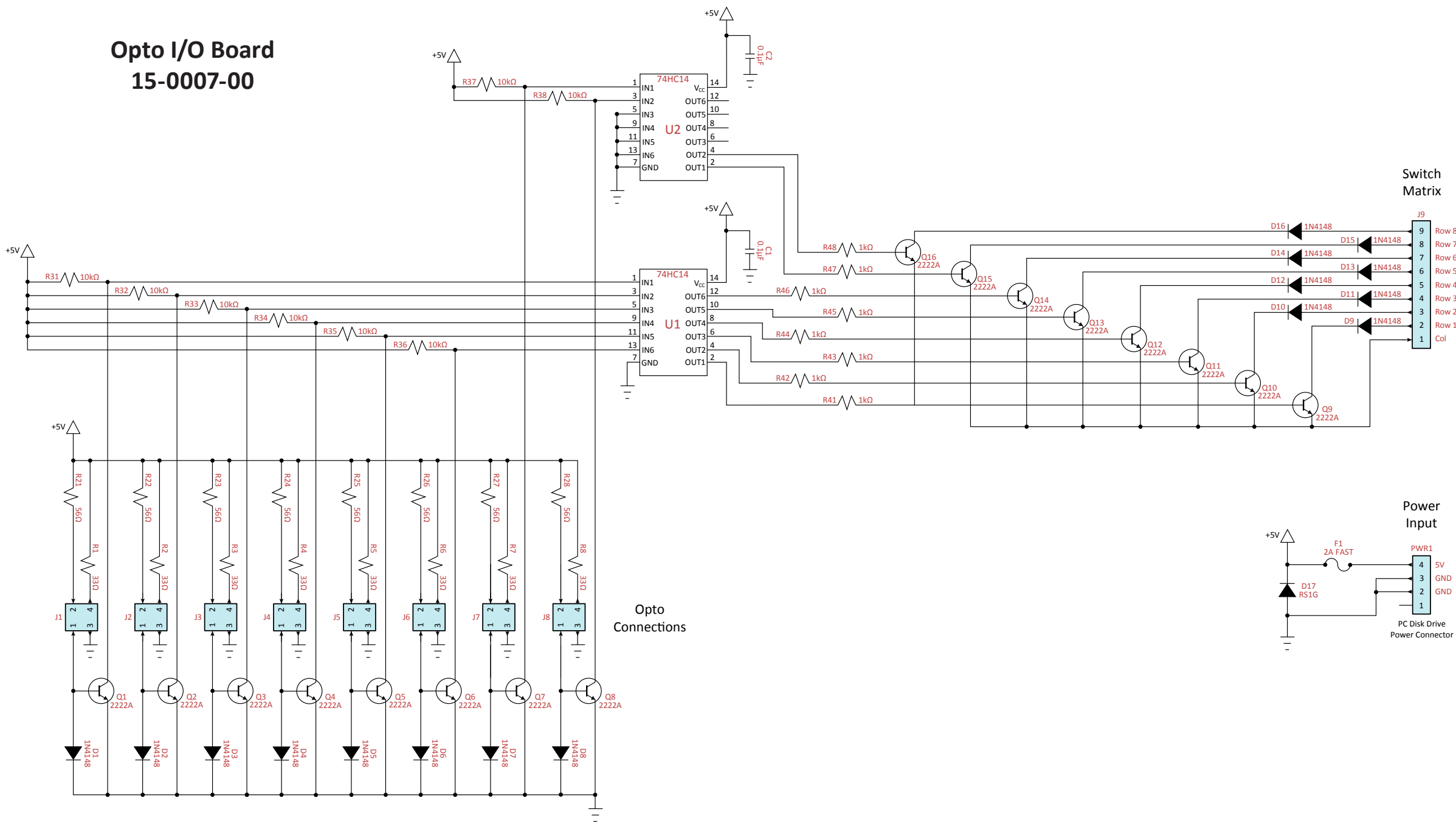
J100-1	RED	+5VDC from Primary ATX Pwr Supply
J100-2	BLK	Ground from Primary ATX Pwr Supply

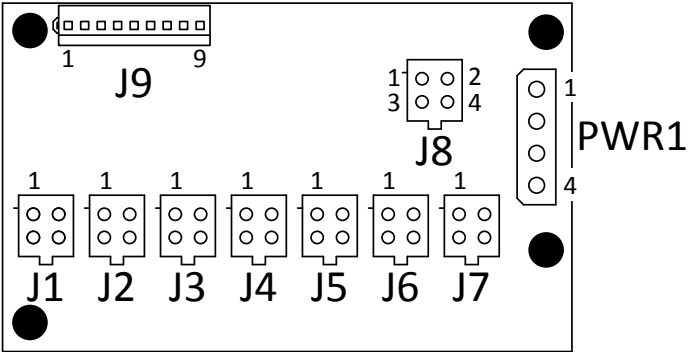


Opto I/O Board
15-0007-00

Component(s)	Part Number	Description
C1, C2	100-104K-050	Capacitor, MLCC, 0805 SMT, 0.1μF, 50V, 10%
D1-D16	110-1000-0S	Diode, 1N4148, SMT, 75V, 300mA
D17	110-5001-0S	Diode, RS1G, SMT, 400V, 1A, 150ns
F1	170-3202-FS	Fuse, Fast, 0805 SMT, 2A, 32V
Q1-Q16	131-0000-0S	Transistor, 2222A, SOT-23 SMT, NPN
R1-R8	123-0033-2HX	Resistor, 2512 SMT, 33Ω, 2W, 5%
R21-R28	120-0056-254	Resistor, 0805 SMT, 56Ω, 0.25W, 5%
R31-R38	120-10K0-334	Resistor, 0805 SMT, 10kΩ, 0.33W, 5%
R41-R48	120-1K00-334	Resistor, 0805 SMT, 1kΩ, 0.33W, 5%
U1, U2	141-0000-0S	Hex Inverters, Schmitt Trigger, 74HC14, SOT-108 SMT
PWR1	31-2502-04	Connector Header, Male, 4-pin, Power
J1-J8	31-2503-04	Connector Header, Male, 4-pin, 2 Rows, 4.2mm
J9	31-2504-09	Header, Male, 9-pin, 2.54mm



Opto I/O Board
15-0007-00









Lower Left Opto I/O Board, 15-0007-00
Connector Pin-outs





J1 Matrixed Sw 25 [ELF Drop Target U-shaped Opto]

J1-1		GRN	RX of ELF Drop Target U-shaped opto
J1-2		WHT	RX of ELF Drop Target U-shaped opto
J1-3		BLK	TX of ELF Drop Target U-shaped opto
J1-4		RED	TX of ELF Drop Target U-shaped opto

J2 Matrixed Sw 26 [ELF Drop Target U-shaped Opto]

J2-1		GRN	RX of ELF Drop Target U-shaped opto
J2-2		WHT	RX of ELF Drop Target U-shaped opto
J2-3		BLK	TX of ELF Drop Target U-shaped opto
J2-4		RED	TX of ELF Drop Target U-shaped opto

J3 Matrixed Sw 27 [ELF Drop Target U-shaped Opto]

J3-1		GRN	RX of ELF Drop Target U-shaped opto
J3-2		WHT	RX of ELF Drop Target U-shaped opto
J3-3		BLK	TX of ELF Drop Target U-shaped opto
J3-4		RED	TX of ELF Drop Target U-shaped opto

J4 Opto #4 Connections

J4-1	Not Used
J4-2	Not Used
J4-3	Not Used
J4-4	Not Used





J5 Opto #5 Connections

J5-1	Not Used
J5-2	Not Used
J5-3	Not Used
J5-4	Not Used





J6 Opto #6 Connections

J6-1	Not Used
J6-2	Not Used
J6-3	Not Used
J6-4	Not Used

J7 Matrixed Sw 31 [Kili Spinner U-shaped Opto]

J7-1		GRN	RX of Kili Spinner U-shaped opto
J7-2		WHT	RX of Kili Spinner U-shaped opto
J7-3		BLK	TX of Kili Spinner U-shaped opto
J7-4		RED	TX of Kili Spinner U-shaped opto

J8 Matrixed Sw 32 [Bag End Opto Pair]

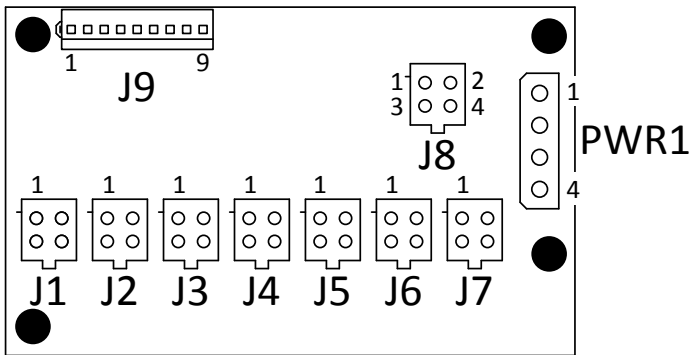
J8-1		GRN	RX of Bag End opto pair ("E" lead)
J8-2		WHT	RX of Bag End opto pair ("C" lead)
J8-3		BLK	TX of Bag End opto pair ("K" lead)
J8-4		RED	TX of Bag End opto pair ("A" lead)

J9 Matrixed Switches

J9-1	GRN-ORN	Matrixed switches, Column 4 from I/O Board, J201-4
J9-2	WHT-BLK	Matrixed switches, Row 1 from I/O Board, J200-1
J9-3	WHT-BRN	Matrixed switches, Row 2 from I/O Board, J200-2
J9-4	WHT-RED	Matrixed switches, Row 3 from I/O Board, J200-3
J9-5	WHT-ORN	Matrixed switches, Row 4 from I/O Board, J200-4
J9-6	WHT-YEL	Matrixed switches, Row 5 from I/O Board, J200-5
J9-7	WHT-GRN	Matrixed switches, Row 6 from I/O Board, J200-6
J9-8	WHT-BLU	Matrixed switches, Row 7 from I/O Board, J200-7
J9-9	WHT-VIO	Matrixed switches, Row 8 from I/O Board, J200-8

PWR1 Power Input

PWR1-1	RED	+5VDC from Primary ATX Pwr Supply
PWR1-2	BLK	Ground from Primary ATX Pwr Supply
PWR1-3	Not Used	
PWR1-4	Not Used	



Right-side Opto I/O Board, 15-0007-00
Connector Pin-outs

J1 Matrixed Sw 17 [DWARF Drop Target U-shaped Opto]

J1-1	GRN	RX of DWARF Drop Target U-shaped opto
J1-2	WHT	RX of DWARF Drop Target U-shaped opto
J1-3	BLK	TX of DWARF Drop Target U-shaped opto
J1-4	RED	TX of DWARF Drop Target U-shaped opto

J2 Matrixed Sw 18 [DWARF Drop Target U-shaped Opto]

J2-1	GRN	RX of DWARF Drop Target U-shaped opto
J2-2	WHT	RX of DWARF Drop Target U-shaped opto
J2-3	BLK	TX of DWARF Drop Target U-shaped opto
J2-4	RED	TX of DWARF Drop Target U-shaped opto

J3 Matrixed Sw 19 [DWARF Drop Target U-shaped Opto]

J3-1	GRN	RX of DWARF Drop Target U-shaped opto
J3-2	WHT	RX of DWARF Drop Target U-shaped opto
J3-3	BLK	TX of DWARF Drop Target U-shaped opto
J3-4	RED	TX of DWARF Drop Target U-shaped opto

J4 Matrixed Sw 20 [DWARF Drop Target U-shaped Opto]

J4-1	GRN	RX of DWARF Drop Target U-shaped opto
J4-2	WHT	RX of DWARF Drop Target U-shaped opto
J4-3	BLK	TX of DWARF Drop Target U-shaped opto
J4-4	RED	TX of DWARF Drop Target U-shaped opto

J5 Matrixed Sw 21 [DWARF Drop Target U-shaped Opto]

J5-1	GRN	RX of DWARF Drop Target U-shaped opto
J5-2	WHT	RX of DWARF Drop Target U-shaped opto
J5-3	BLK	TX of DWARF Drop Target U-shaped opto
J5-4	RED	TX of DWARF Drop Target U-shaped opto

J6 Matrixed Sw 22 [MAN Drop Target U-shaped Opto]

J6-1	GRN	RX of MAN Drop Target U-shaped opto
J6-2	WHT	RX of MAN Drop Target U-shaped opto
J6-3	BLK	TX of MAN Drop Target U-shaped opto
J6-4	RED	TX of MAN Drop Target U-shaped opto

J7 Matrixed Sw 23 [MAN Drop Target U-shaped Opto]

J7-1	GRN	RX of MAN Drop Target U-shaped opto
J7-2	WHT	RX of MAN Drop Target U-shaped opto
J7-3	BLK	TX of MAN Drop Target U-shaped opto
J7-4	RED	TX of MAN Drop Target U-shaped opto

J8 Matrixed Sw 24 [MAN Drop Target U-shaped Opto]

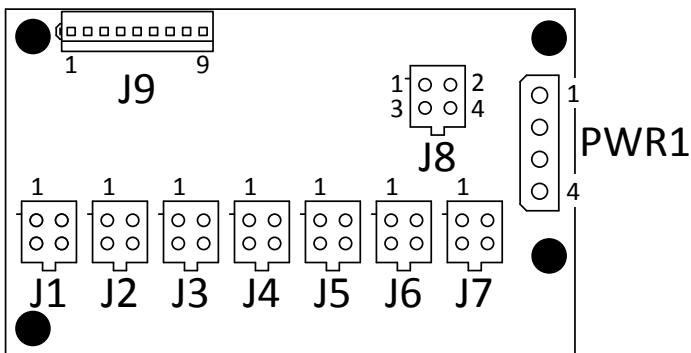
J8-1	GRN	RX of MAN Drop Target U-shaped opto
J8-2	WHT	RX of MAN Drop Target U-shaped opto
J8-3	BLK	TX of MAN Drop Target U-shaped opto
J8-4	RED	TX of MAN Drop Target U-shaped opto

J9 Matrixed Switches

J9-1	GRN-RED	Matrixed switches, Column 3 from I/O Board, J201-3
J9-2	WHT-BLK	Matrixed switches, Row 1 from I/O Board, J200-1
J9-3	WHT-BRN	Matrixed switches, Row 2 from I/O Board, J200-2
J9-4	WHT-RED	Matrixed switches, Row 3 from I/O Board, J200-3
J9-5	WHT-ORN	Matrixed switches, Row 4 from I/O Board, J200-4
J9-6	WHT-YEL	Matrixed switches, Row 5 from I/O Board, J200-5
J9-7	WHT-GRN	Matrixed switches, Row 6 from I/O Board, J200-6
J9-8	WHT-BLU	Matrixed switches, Row 7 from I/O Board, J200-7
J9-9	WHT-VIO	Matrixed switches, Row 8 from I/O Board, J200-8





PWR1 Power Input

PWR1-1	RED	+5VDC from Primary ATX Pwr Supply
PWR1-2	BLK	Ground from Primary ATX Pwr Supply
PWR1-3	Not Used	
PWR1-4	Not Used	







Upper Left Opto I/O Board, 15-0007-00
Connector Pin-outs




J1 Matrixed Sw 9 [Balin VUK Opto Pair]

J1-1		GRN	RX of Balin VUK opto pair ("E" lead)
J1-2		WHT	RX of Balin VUK opto pair ("C" lead)
J1-3		BLK	TX of Balin VUK opto pair ("K" lead)
J1-4		RED	TX of Balin VUK opto pair ("A" lead)

J2 Matrixed Sw 10 [Radagast VUK Opto Pair]

J2-1		GRN	RX of Radagast VUK opto pair ("E" lead)
J2-2		WHT	RX of Radagast VUK opto pair ("C" lead)
J2-3		BLK	TX of Radagast VUK opto pair ("K" lead)
J2-4		RED	TX of Radagast VUK opto pair ("A" lead)

J3 Matrixed Sw 11 [Gandalf Ramp Made Opto Pair]

J3-1		GRN	RX of Gandalf Ramp Made opto pair ("E" lead)
J3-2		WHT	RX of Gandalf Ramp Made opto pair ("C" lead)
J3-3		BLK	TX of Gandalf Ramp Made opto pair ("K" lead)
J3-4		RED	TX of Gandalf Ramp Made opto pair ("A" lead)


J4 Matrixed Sw 12 [Bilbo Ramp Made Opto Pair]

J4-1		GRN	RX of Bilbo Ramp Made opto pair ("E" lead)
J4-2		WHT	RX of Bilbo Ramp Made opto pair ("C" lead)
J4-3		BLK	TX of Bilbo Ramp Made opto pair ("K" lead)
J4-4		RED	TX of Bilbo Ramp Made opto pair ("A" lead)





J5 Matrixed Sw 13 [Bilbo Ramp Enter Opto Pair]

J5-1		GRN	RX of Bilbo Ramp Enter opto pair ("E" lead)
J5-2		WHT	RX of Bilbo Ramp Enter opto pair ("C" lead)
J5-3		BLK	TX of Bilbo Ramp Enter opto pair ("K" lead)
J5-4		RED	TX of Bilbo Ramp Enter opto pair ("A" lead)





J6 Matrixed Sw 14 [Gandalf Ramp Enter Opto Pair]

J6-1		GRN	RX of Gandalf Ramp Enter opto pair ("E" lead)
J6-2		WHT	RX of Gandalf Ramp Enter opto pair ("C" lead)
J6-3		BLK	TX of Gandalf Ramp Enter opto pair ("K" lead)
J6-4		RED	TX of Gandalf Ramp Enter opto pair ("A" lead)

J7 Matrixed Sw 15 [Subway Enter Opto Pair]

J7-1		GRN	RX of Subway Enter opto pair ("E" lead)
J7-2		WHT	RX of Subway Enter opto pair ("C" lead)
J7-3		BLK	TX of Subway Enter opto pair ("K" lead)
J7-4		RED	TX of Subway Enter opto pair ("A" lead)

J8 Matrixed Sw 16 [Fili Spinner U-shaped Opto]

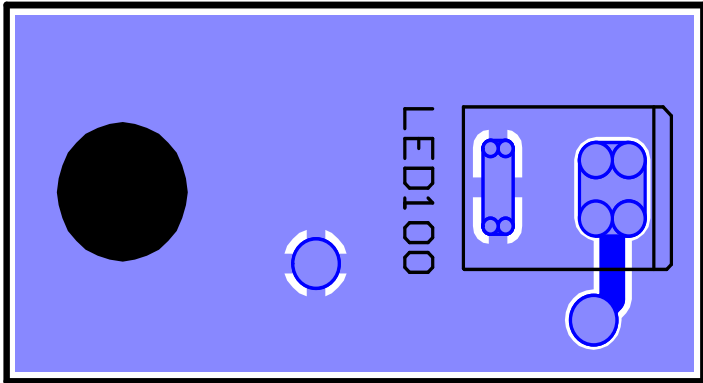
J8-1		GRN	RX of Fili Spinner U-shaped opto
J8-2		WHT	RX of Fili Spinner U-shaped opto
J8-3		BLK	TX of Fili Spinner U-shaped opto
J8-4		RED	TX of Fili Spinner U-shaped opto

J9 Matrixed Switches

J9-1	GRN-BRN	Matrixed switches, Column 2 from I/O Board, J201-2
J9-2	WHT-BLK	Matrixed switches, Row 1 from I/O Board, J200-1
J9-3	WHT-BRN	Matrixed switches, Row 2 from I/O Board, J200-2
J9-4	WHT-RED	Matrixed switches, Row 3 from I/O Board, J200-3
J9-5	WHT-ORN	Matrixed switches, Row 4 from I/O Board, J200-4
J9-6	WHT-YEL	Matrixed switches, Row 5 from I/O Board, J200-5
J9-7	WHT-GRN	Matrixed switches, Row 6 from I/O Board, J200-6
J9-8	WHT-BLU	Matrixed switches, Row 7 from I/O Board, J200-7
J9-9	WHT-VIO	Matrixed switches, Row 8 from I/O Board, J200-8

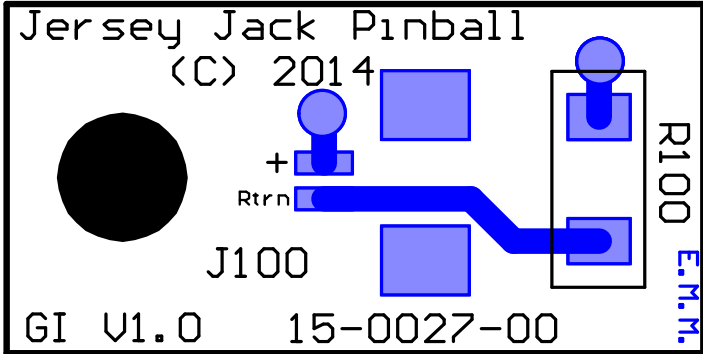
PWR1 Power Input

PWR1-1	RED	+5VDC from Primary ATX Pwr Supply
PWR1-2	BLK	Ground from Primary ATX Pwr Supply
PWR1-3	Not Used	
PWR1-4	Not Used	



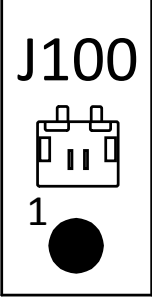
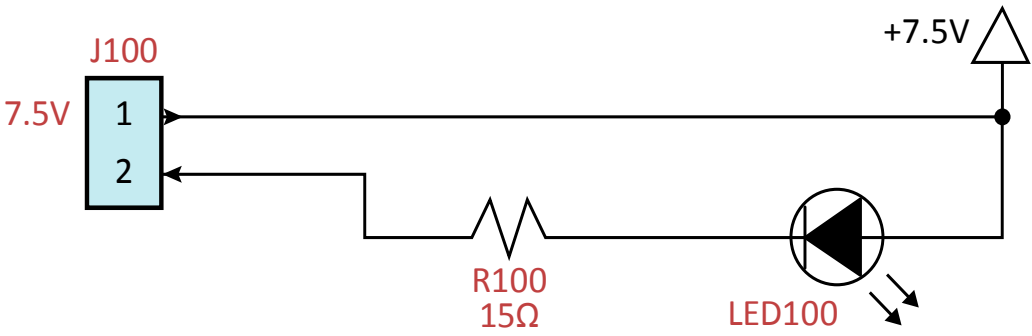
GI LED Board, 1mm
15-0027-00

(games manufactured before Aug 11, 2016)



Component(s)	Part Number	Description
R100	124-0015-254	Resistor, 1206 SMT, 15Ω, 0.25W, 5%
LED100	24-0019-05	LED, SMT, High-Power, Cool White, 5700K
J100	30-2200-02	Header, SMT, Male, 2-Pin, 1mm

GI LED Board, 1mm
15-0027-00

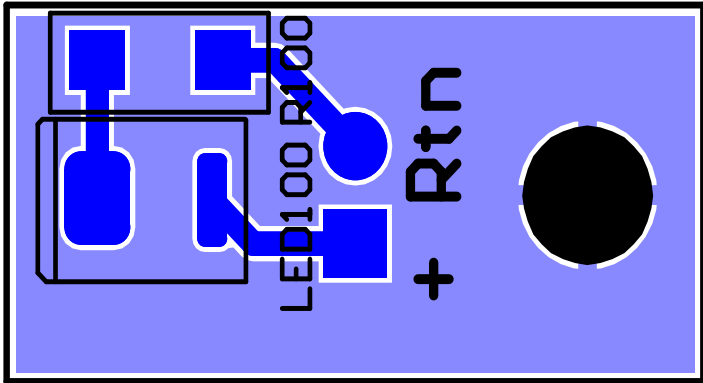


GI LED Board, 1mm
15-0027-00
Connector Pin-outs

J100 LED Control/Power Input

J100-1	GRY	+7.5VDC from BAG Controller Board, an odd-numbered GI connector (J105-J113) pin
J100-2	GRY-XXX	LED100 return to BAG Controller Board, an even-numbered GI connector (J105-J113) pin

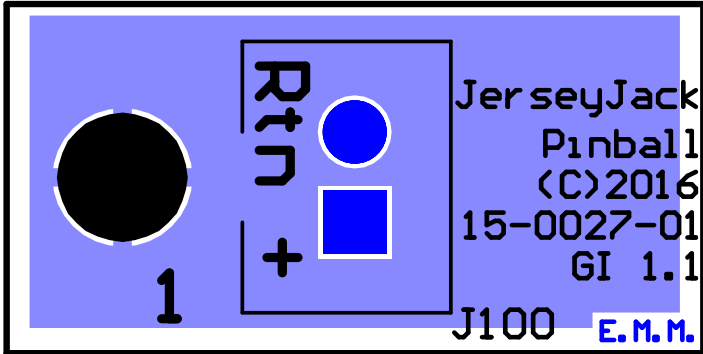
Note: XXX specifies the color of the stripe on the second wire (BLK, BRN, RED ORN, YEL, GRN, BLU or VIO).



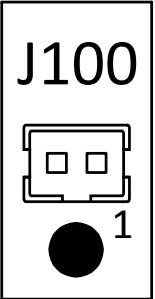
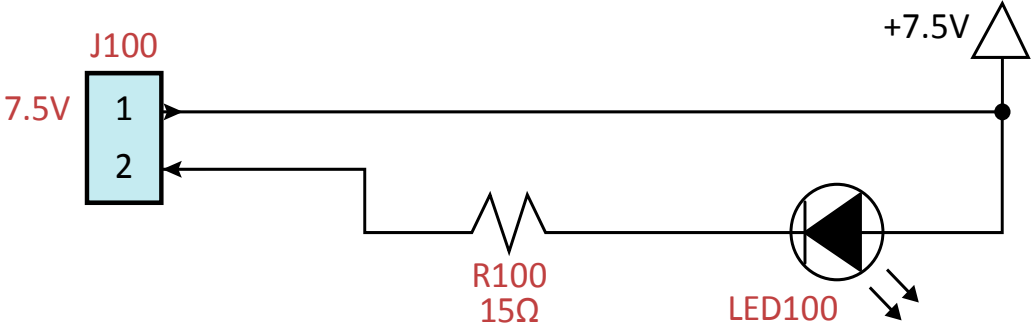
GI LED Board, 2.5mm
15-0027-01

(games manufactured on/after Aug 11, 2016)

Component(s)	Part Number	Description
R100	124-0015-254	Resistor, 1206 SMT, 15Ω, 0.25W, 5%
LED100	24-0019-05	LED, SMT, High-Power, Cool White, 5700K
J100	30-2202-02	Header, Male, 2-Pin, 2.5mm



GI LED Board, 2.5mm
15-0027-01

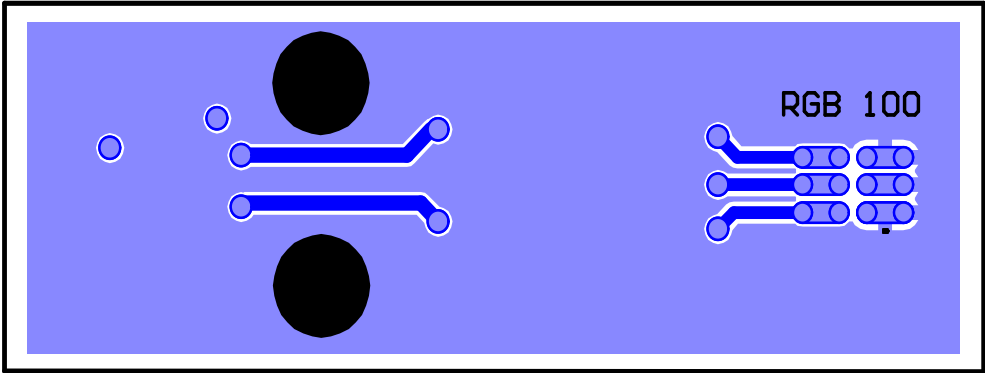


GI LED Board, 2.5mm
15-0027-01
Connector Pin-outs

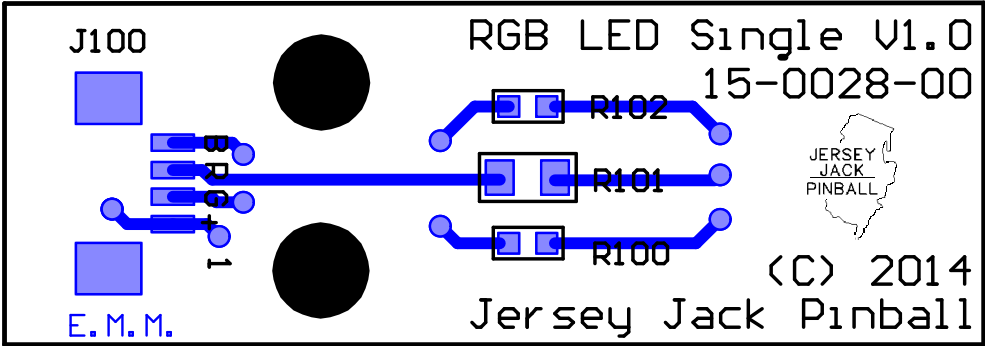
J100 LED Control/Power Input

J100-1	GRY	+7.5VDC from BAG Controller Board, an odd-numbered GI connector (J105-J113) pin
J100-2	GRY- XXX	LED100 return to BAG Controller Board, an even-numbered GI connector (J105-J113) pin

Note: **XXX** specifies the color of the stripe on the second wire (BLK, BRN, RED ORN, YEL, GRN, BLU or VIO).

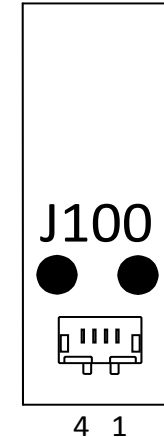
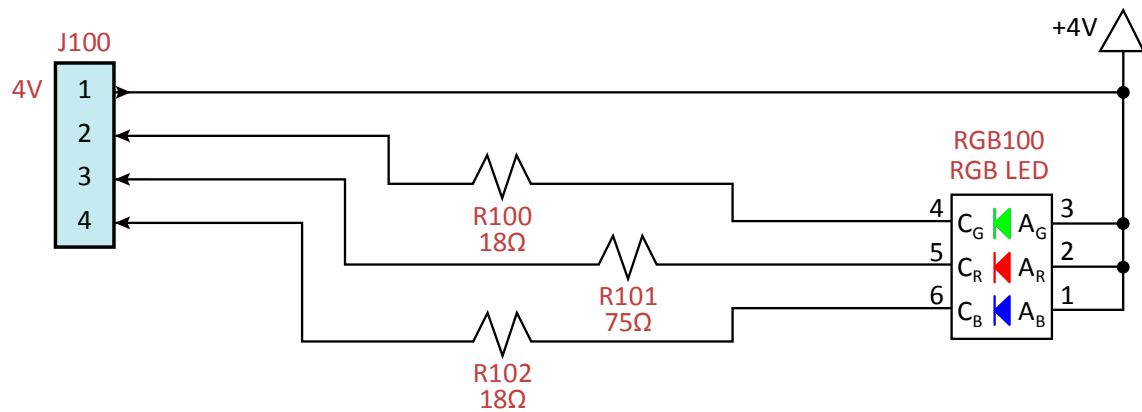


Single RGB LED Board, 1mm
15-0028-00
(games manufactured before Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2200-04	Header, SMT, Male, 4-Pin, 1mm

Single RGB LED Board, 1mm 15-0028-00

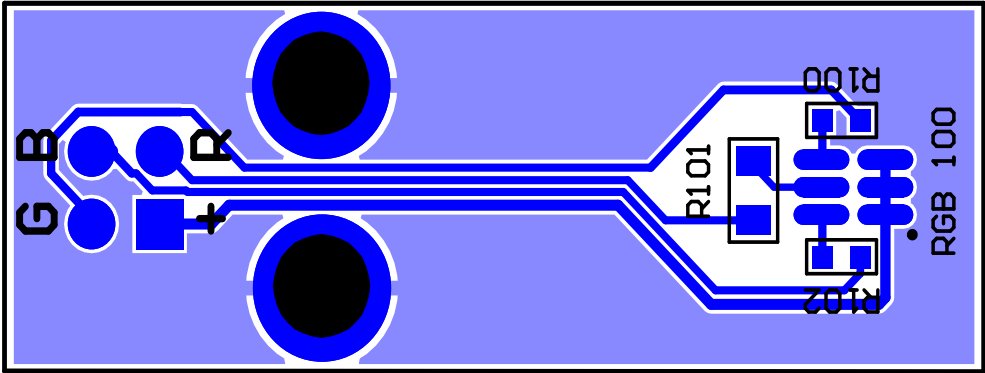


Single RGB LED Board, 1mm 15-0028-00 Connector Pin-outs

J100 RGB LED Control/Power Input

J100-1	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103

Note: XXX specifies the base color of the wires in the connector (BLK, BRN, RED ORN, YEL, GRN, BLU or VIO). If the base color matches the stripe (GRN, RED or BLU), a GRY stripe is used for that wire.



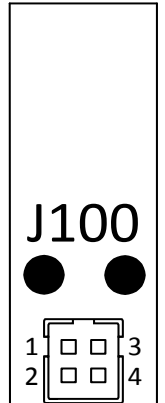
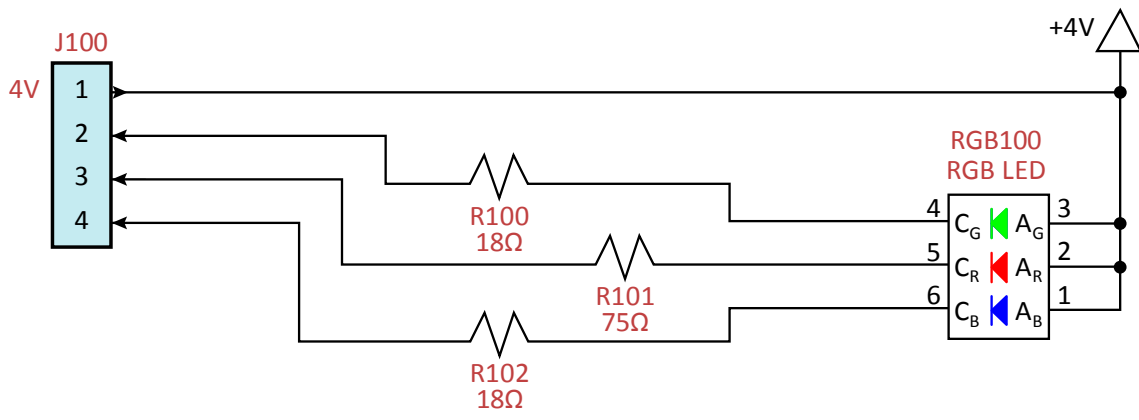
Single RGB LED Board, 2.5mm
15-0028-01

(games manufactured on/after Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2203-04	Header, Male, 4-Pin, 2 Rows, 2.5mm

Single RGB LED Board, 2.5mm 15-0028-01

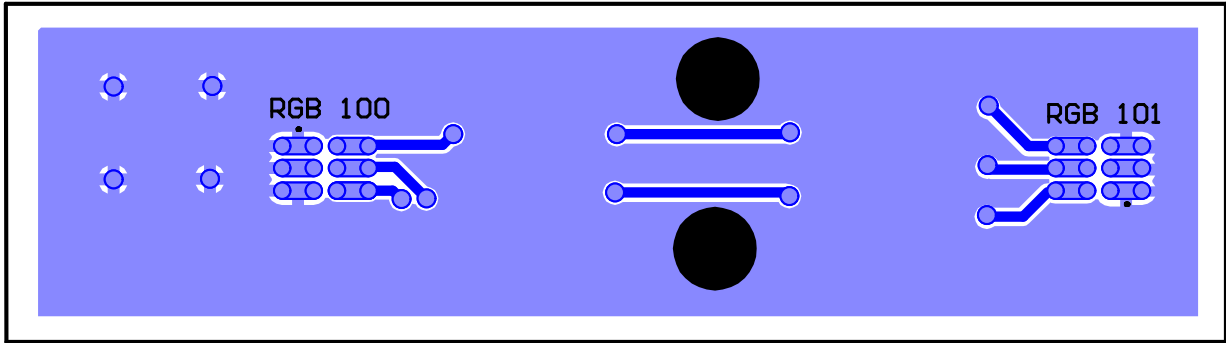


Single RGB LED Board, 2.5mm 15-0028-01 Connector Pin-outs

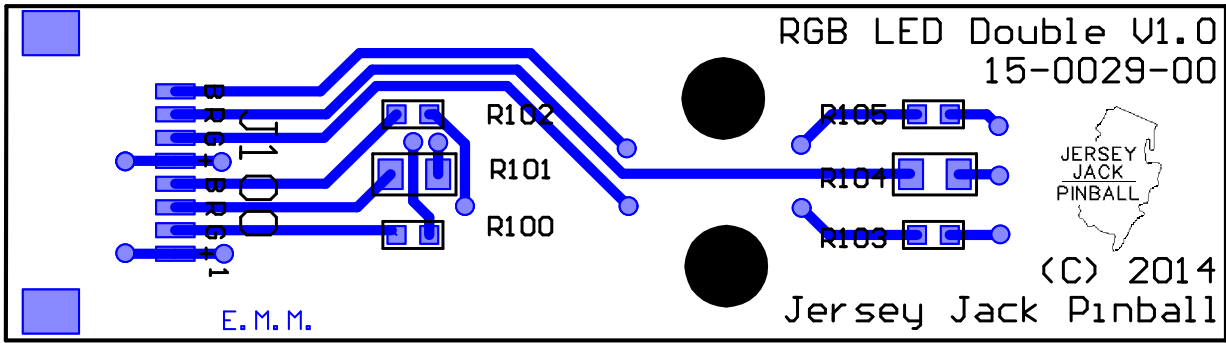
J100 RGB LED Control/Power Input

J100-1	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103

Note: XXX specifies the base color of the wires in the connector (BLK, BRN, RED, ORN, YEL, GRN, BLU or VIO). If the base color matches the stripe (GRN, RED or BLU), a GRY stripe is used for that wire.

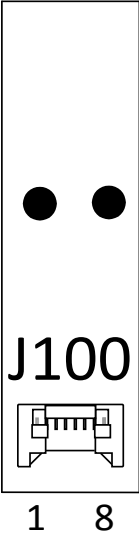
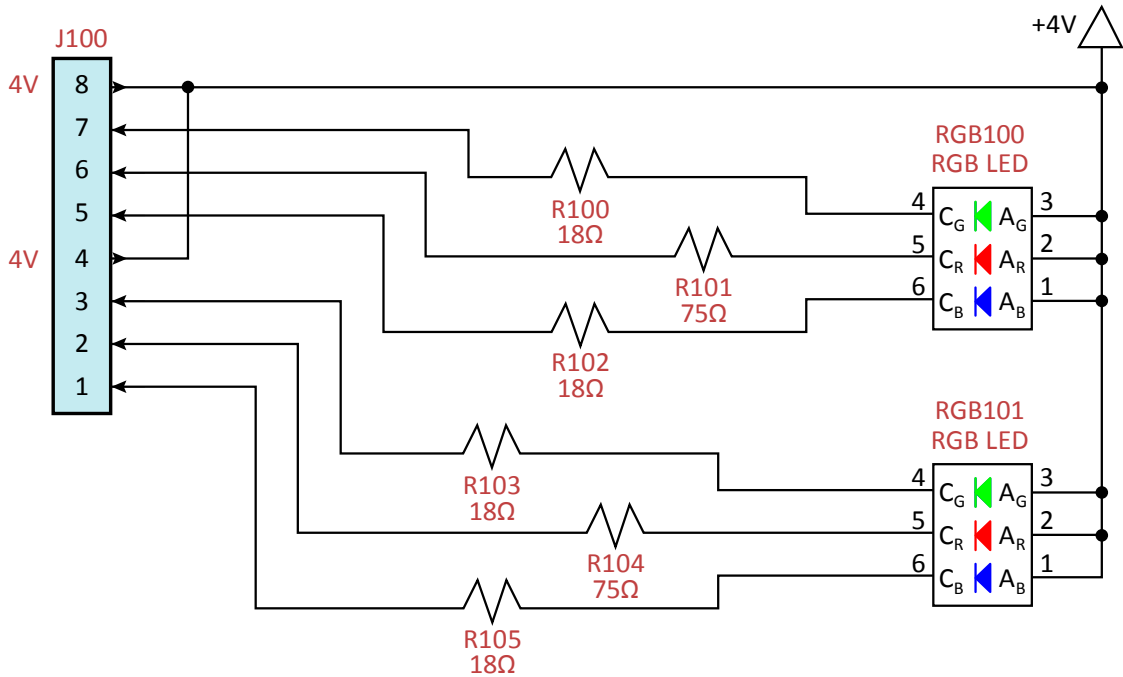


Double RGB LED Board, 1mm
15-0029-00
(games manufactured before Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102, R103, R105	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101, R104	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100, RGB101	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2201-08	Header, SMT, Male, 8-Pin, Rt Angle, 1mm

Double RGB LED Board, 1mm
15-0029-00

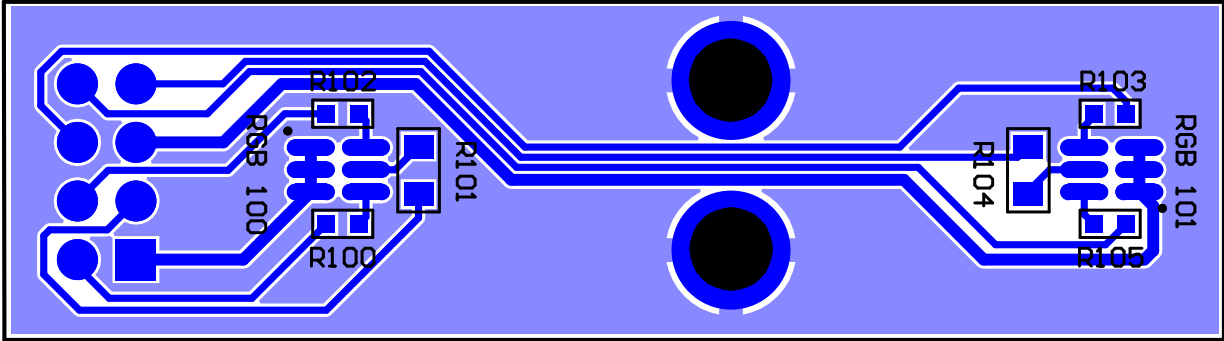


Double RGB LED Board, 1mm
15-0029-00
Connector Pin-outs

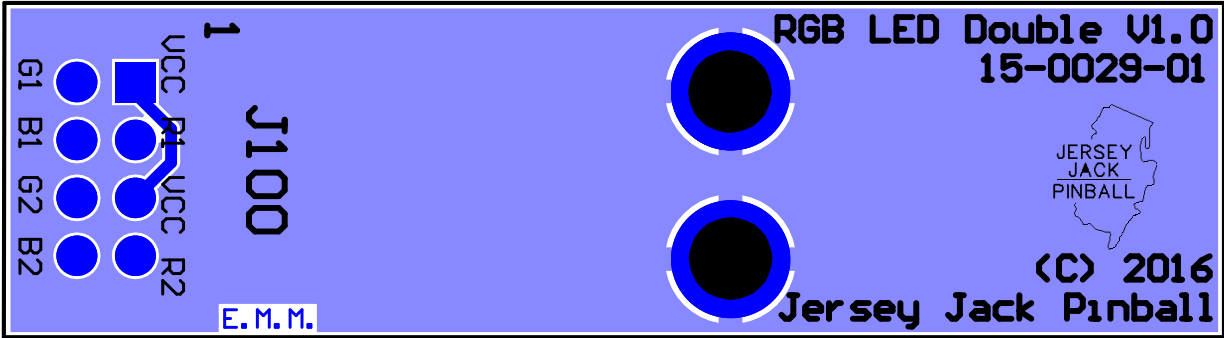
J100 RGB LED Control/Power Input

J100-1	XXX-BLU	RGB101 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-RED	RGB101 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-GRN	RGB101 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-5	YYY-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-6	YYY-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-7	YYY-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-8	YYY	+4VDC from an RGB LED Controller Board, J101, J102 or J103

Note: XXX & YYY specify the two base colors of the wires in the connector (BLK, BRN, RED, ORN, YEL, GRN, BLU or VIO). If a base color matches a stripe (GRN, RED or BLU), a GRY stripe is used for that wire.

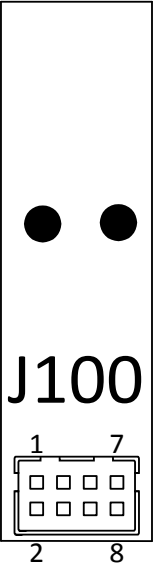
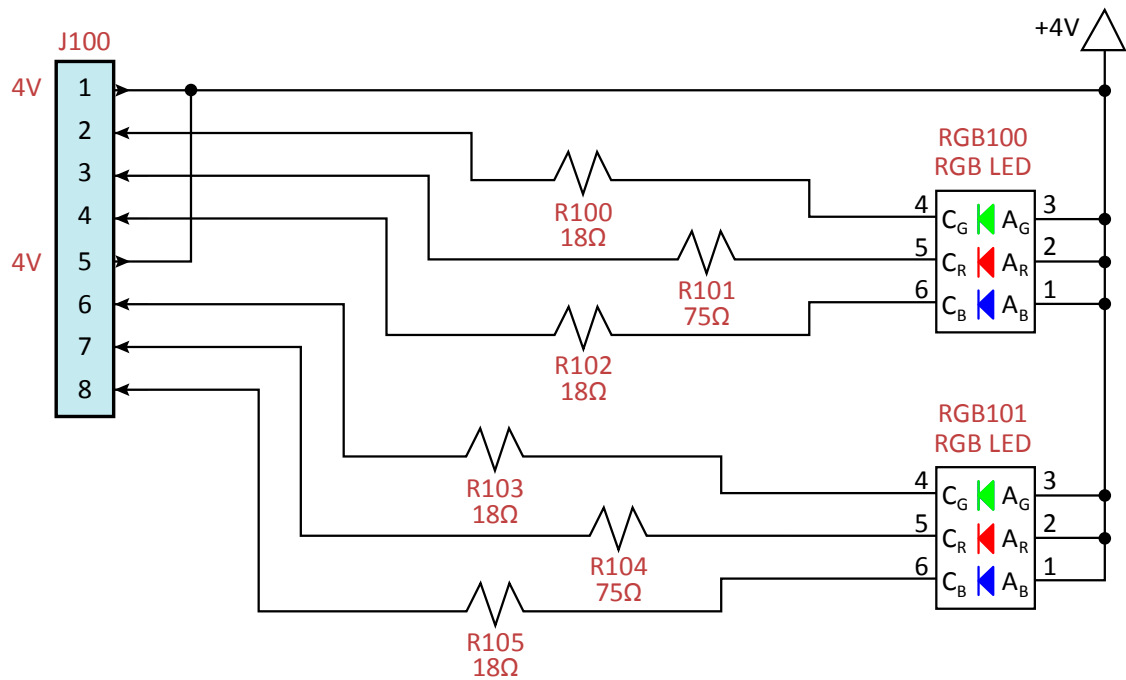


Double RGB LED Board, 2.5mm
15-0029-01
(games manufactured on/after Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102, R103, R105	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101, R104	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100, RGB101	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2203-08	Header, Male, 8-Pin, 2 Rows, 2.5mm

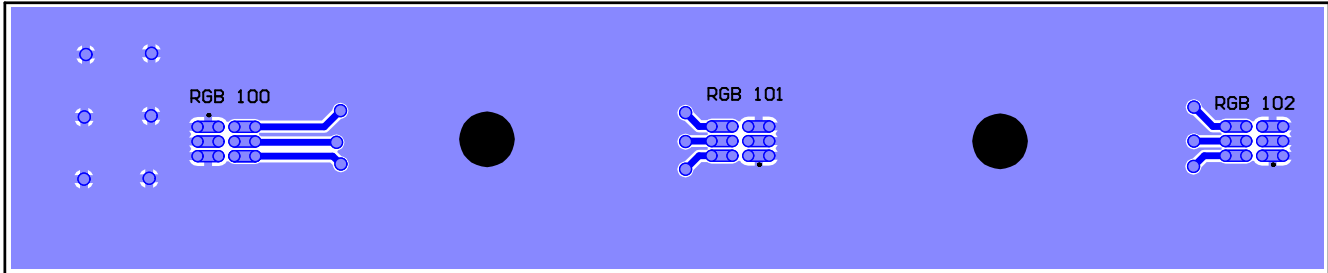
Double RGB LED Board, 2.5mm
15-0029-01



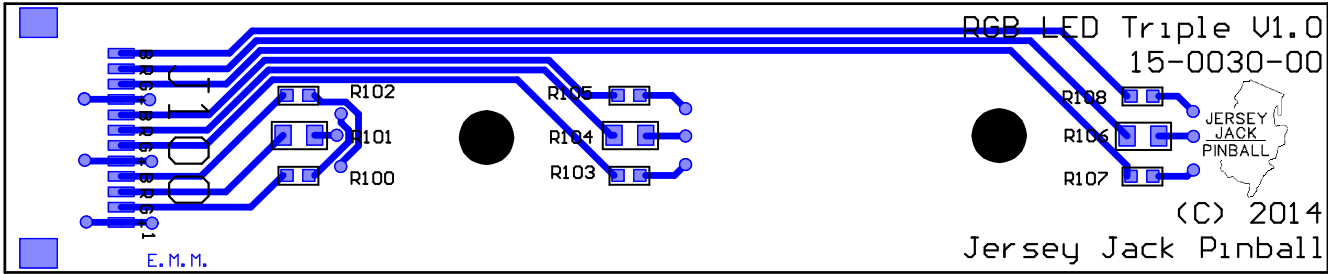
Double RGB LED Board, 2.5mm
15-0029-01
Connector Pin-outs

J100 RGB LED Control/Power Input		
J100-1	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-GRN	RGB101 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-RED	RGB101 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX-BLU	RGB101 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-5	Not Used	
J100-6	YYY-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-7	YYY-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-8	YYY-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103

Note: XXX & YYY specify the two base colors of the wires in the connector (BLK, BRN, RED, ORN, YEL, GRN, BLU or VIO). If a base color matches a stripe (GRN, RED or BLU), a GRY stripe is used for that wire.

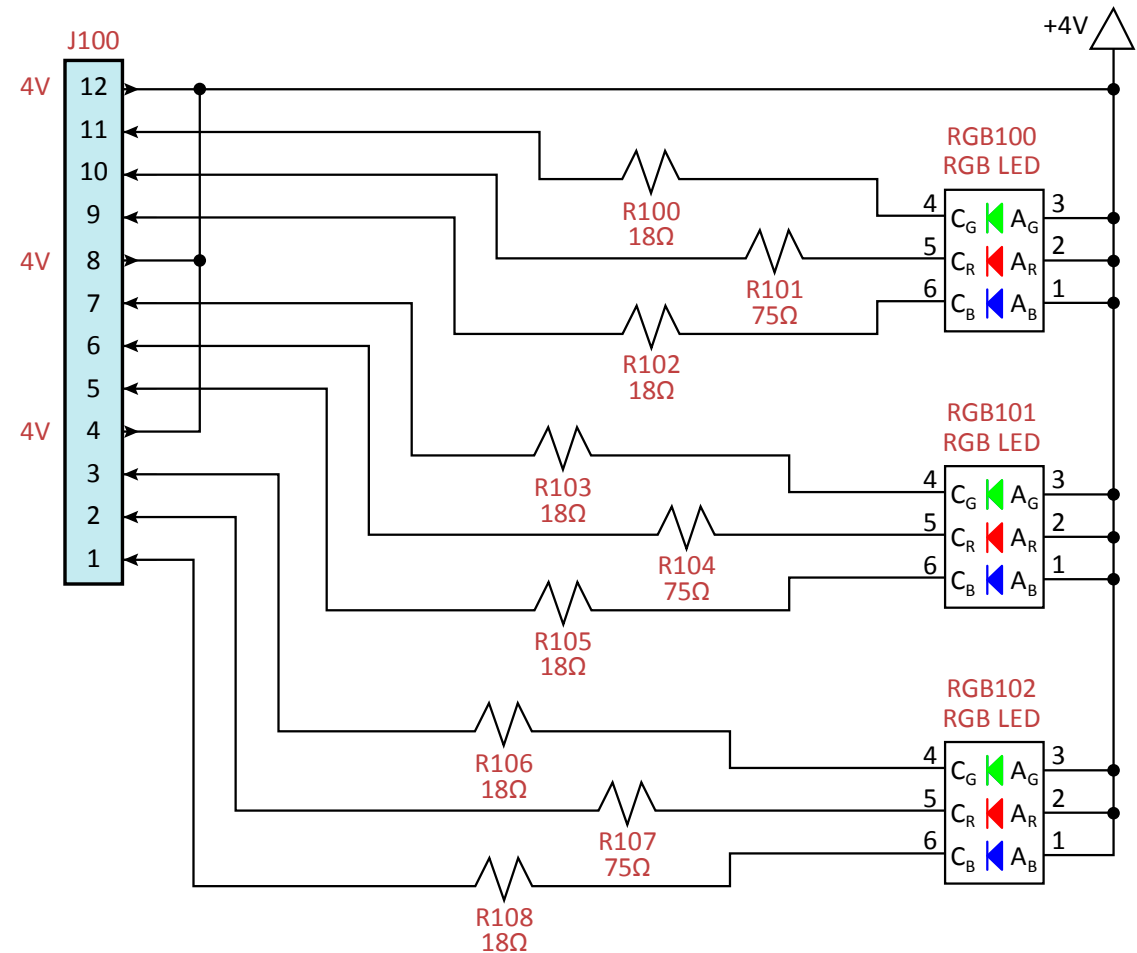


Triple RGB LED Board, 1mm
15-0030-00
(games manufactured before Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102, R103, R105, R106, R108	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101, R104, R107	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100-RGB102	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2201-12	Header, SMT, Male, 12-Pin, Rt Angle, 1mm

Triple RGB LED Board, 1mm 15-0030-00

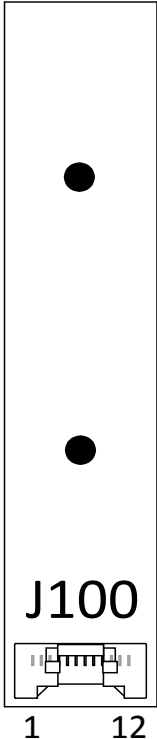


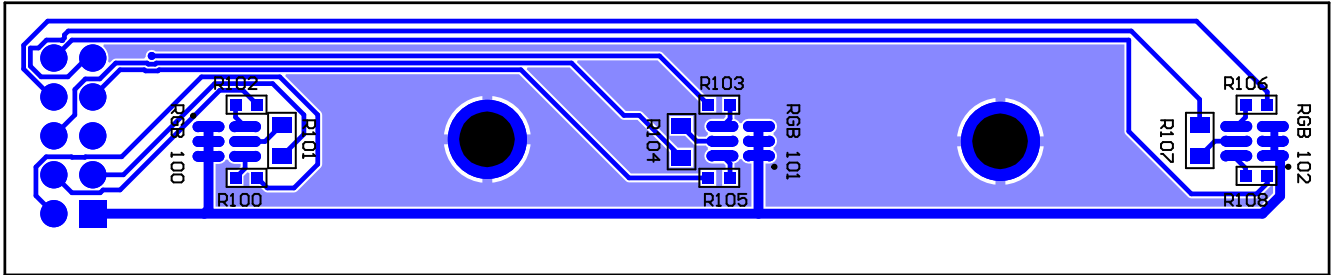
Triple RGB LED Board, 1mm 15-0030-00 Connector Pin-outs

J100 RGB LED Control/Power Input

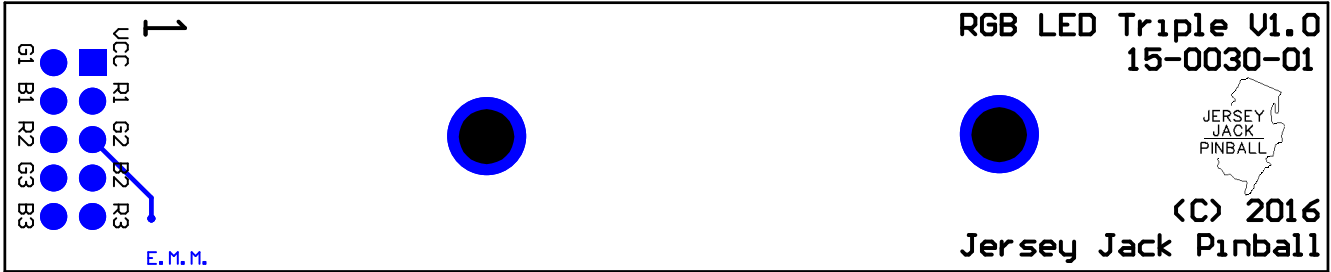
J100-1	XXX-BLU	RGB102 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-RED	RGB102 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-GRN	RGB102 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-5	YYY-BLU	RGB101 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-6	YYY-RED	RGB101 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-7	YYY-GRN	RGB101 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-8	YYY	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-9	ZZZ-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-10	ZZZ-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-11	ZZZ-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-12	ZZZ	+4VDC from an RGB LED Controller Board, J101, J102 or J103

Note: XXX, YYY & ZZZ specify the three base colors of the wires in the connector (BLK, BRN, RED, ORN, YEL, GRN, BLU or VIO). If a base color matches a stripe (GRN, RED or BLU), a GRY stripe is used for that wire.



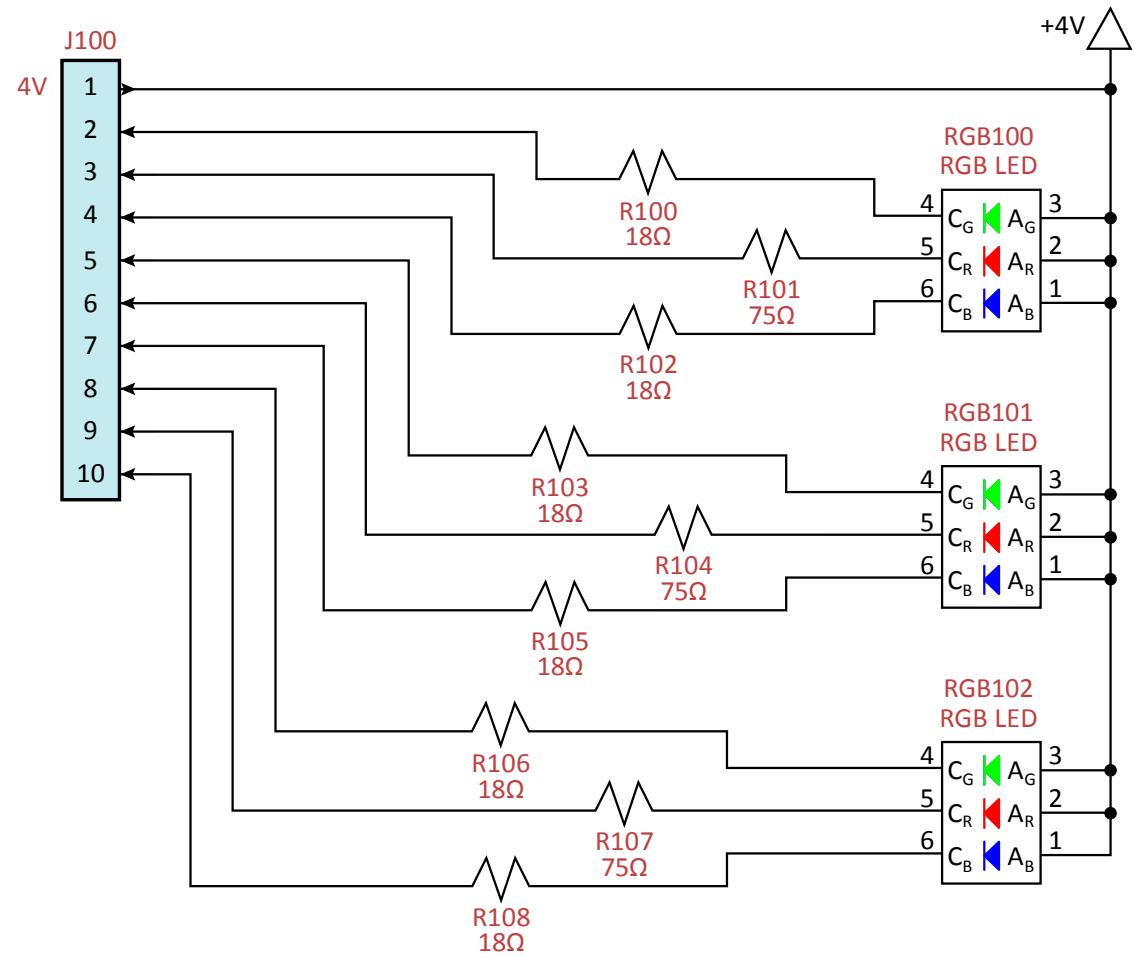


Triple RGB LED Board, 2.5mm
15-0030-01
(games manufactured on/after Aug 11, 2016)



Component(s)	Part Number	Description
R100, R102, R103, R105, R106, R108	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R101, R104, R107	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100-RGB102	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2203-10	Header, Male, 10-Pin, 2 Rows, 2.5mm

Triple RGB LED Board, 2.5mm 15-0030-01

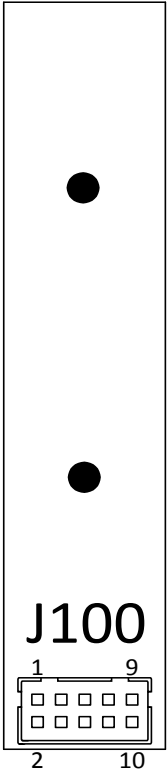


Triple RGB LED Board, 2.5mm 15-0030-01 Connector Pin-outs

J100 RGB LED Control/Power Input

J100-1	XXX	+4VDC from an RGB LED Controller Board, J101, J102 or J103
J100-2	XXX-GRN	RGB102 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-3	XXX-RED	RGB102 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-4	XXX-BLU	RGB102 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-5	YYY-GRN	RGB101 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-6	YYY-RED	RGB101 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-7	YYY-BLU	RGB101 BLU return to an RGB LED Controller Board, J101, J102 or J103
J100-8	ZZZ-GRN	RGB100 GRN return to an RGB LED Controller Board, J101, J102 or J103
J100-9	ZZZ-RED	RGB100 RED return to an RGB LED Controller Board, J101, J102 or J103
J100-10	ZZZ-BLU	RGB100 BLU return to an RGB LED Controller Board, J101, J102 or J103

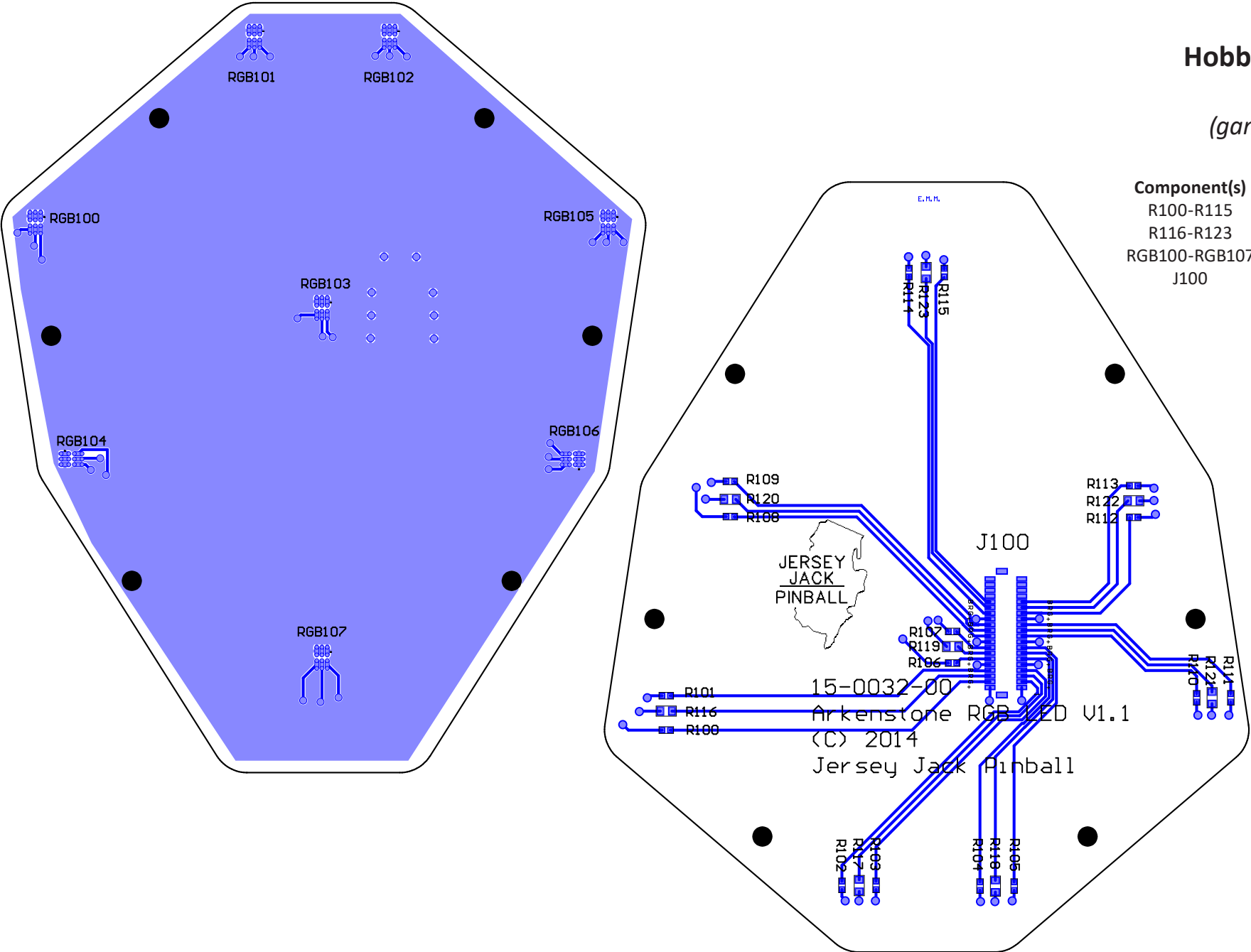
Note: XXX, YYY & ZZZ specify the three base colors of the wires in the connector (BLK, BRN, RED, ORN, YEL, GRN, BLU or VIO). If a base color matches a stripe (GRN, RED or BLU), a GRY stripe is used for that wire.



Hobbit Arkenstone RGB LED Board, 1mm

15-0032-00

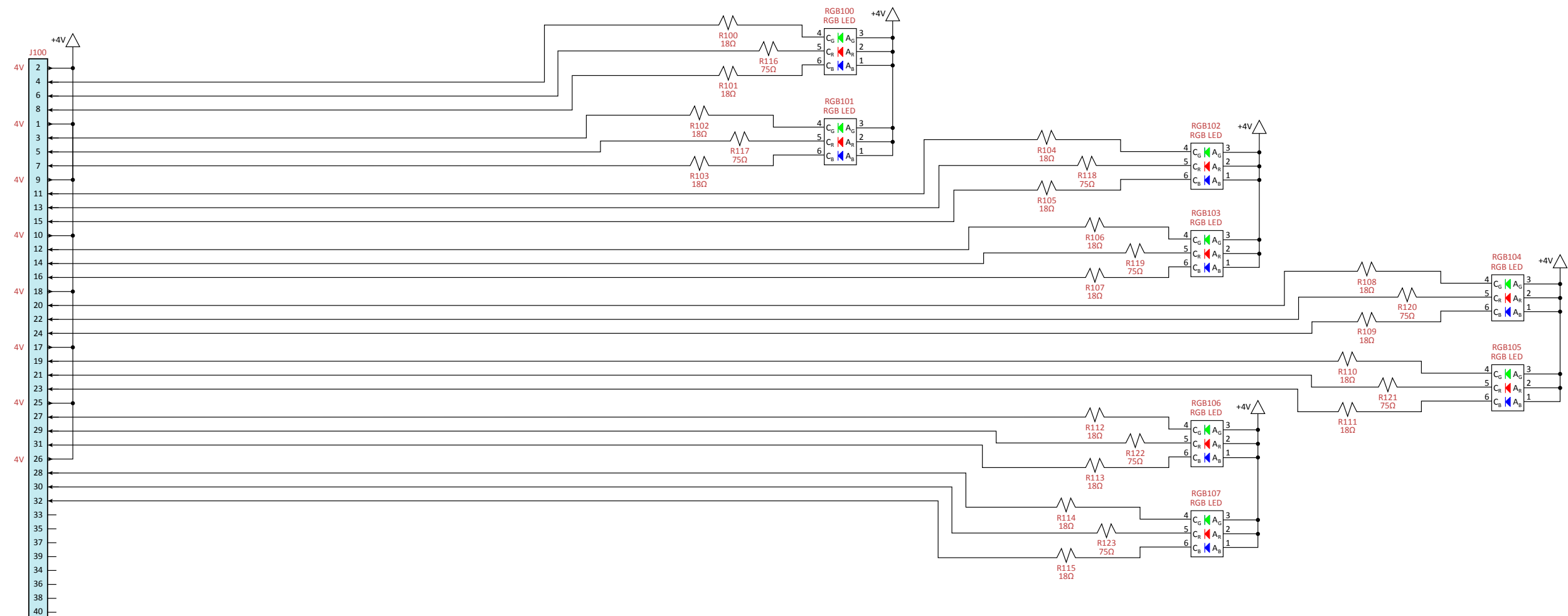
(games manufactured before Aug 11, 2016)



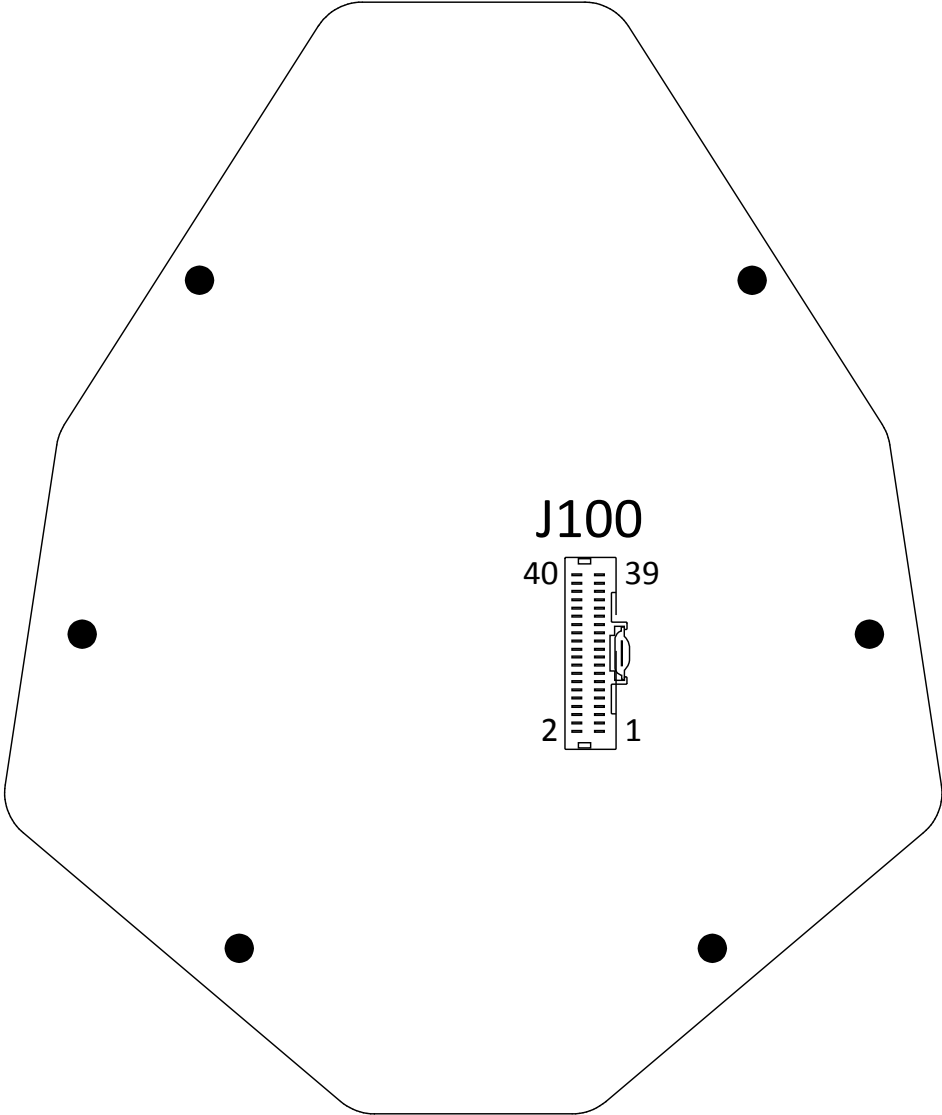
Component(s)	Part Number	Description
R100-R115	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R116-R123	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100-RGB107	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2200-40	Header, SMT, Male, 40-Pin, 2 Rows, 1mm










Hobbit Arkenstone RGB LED Board, 1mm

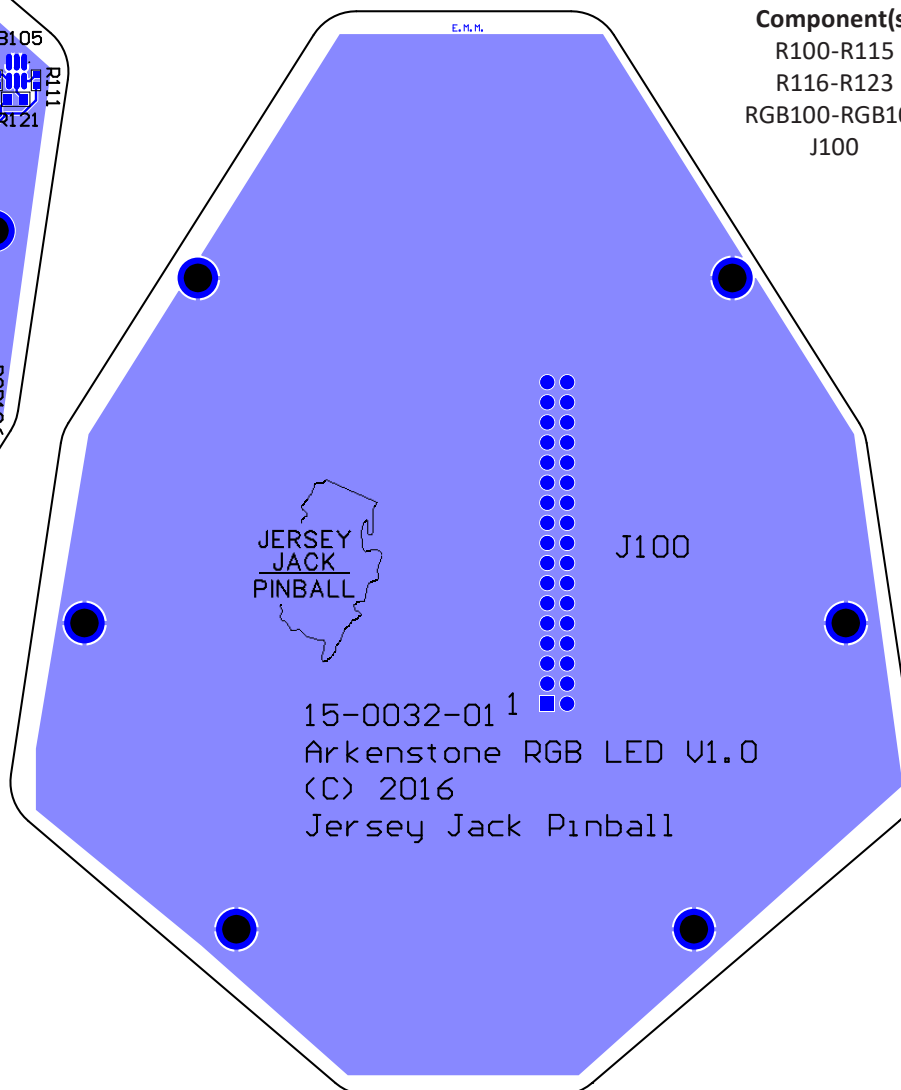
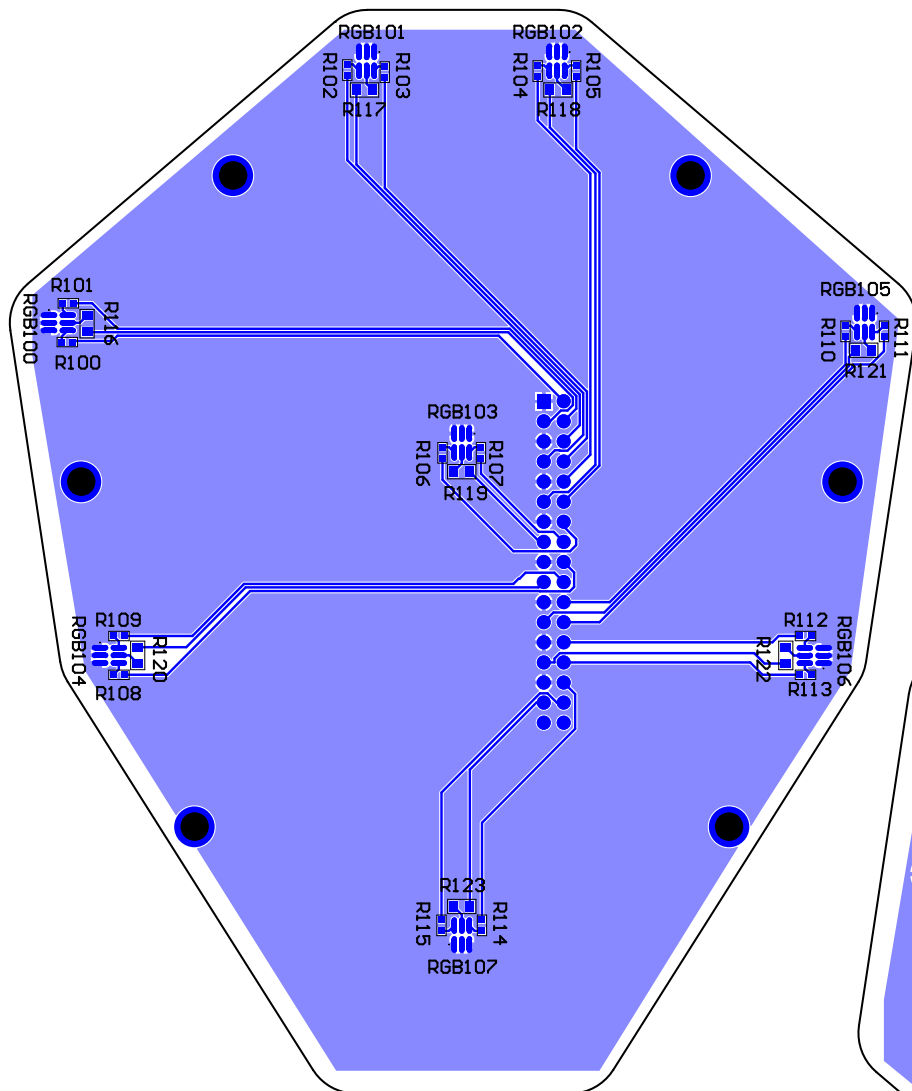
15-0032-00



Hobbit Arkenstone RGB LED Board, 1mm
15-0032-00
Connector Pin-outs



J100 RGB LED Control/Power Input (RGB Cable 19-3095-05)			
J100-2		BLK	+4VDC from RGB LED Controller Board C, J102-3
J100-4		BLK-GRN	RGB100 GRN return to RGB LED Controller Board C, J102-6
J100-6		BLK-RED	RGB100 RED return to RGB LED Controller Board C, J102-4
J100-8		BLK-BLU	RGB100 BLU return to RGB LED Controller Board C, J102-2
J100-1		BRN	+4VDC from RGB LED Controller Board C, J102-9
J100-3		BRN-GRN	RGB101 GRN return to RGB LED Controller Board C, J102-12
J100-5		BRN-RED	RGB101 RED return to RGB LED Controller Board C, J102-10
J100-7		BRN-BLU	RGB101 BLU return to RGB LED Controller Board C, J102-8
J100-9		RED	+4VDC from RGB LED Controller Board C, J102-15
J100-11		RED-GRN	RGB102 GRN return to RGB LED Controller Board C, J102-18
J100-13		RED-GRY	RGB102 RED return to RGB LED Controller Board C, J102-16
J100-15		RED-BLU	RGB102 BLU return to RGB LED Controller Board C, J102-14
J100-10		ORN	+4VDC from RGB LED Controller Board C, J102-21
J100-12		ORN-GRN	RGB103 GRN return to RGB LED Controller Board C, J102-24
J100-14		ORN-RED	RGB103 RED return to RGB LED Controller Board C, J102-22
J100-16		ORN-BLU	RGB103 BLU return to RGB LED Controller Board C, J102-20
J100-18		YEL	+4VDC from RGB LED Controller Board C, J102-27
J100-20		YEL-GRN	RGB104 GRN return to RGB LED Controller Board C, J102-30
J100-22		YEL-RED	RGB104 RED return to RGB LED Controller Board C, J102-28
J100-24		YEL-BLU	RGB104 BLU return to RGB LED Controller Board C, J102-26
J100-17		GRN	+4VDC from RGB LED Controller Board C, J102-33
J100-19		GRN-GRY	RGB105 GRN return to RGB LED Controller Board C, J102-36
J100-21		GRN-RED	RGB105 RED return to RGB LED Controller Board C, J102-34
J100-23		GRN-BLU	RGB105 BLU return to RGB LED Controller Board C, J102-32
J100-25		BLU	+4VDC from RGB LED Controller Board C, J102-39
J100-27		BLU-GRN	RGB106 GRN return to RGB LED Controller Board C, J102-42
J100-29		BLU-RED	RGB106 RED return to RGB LED Controller Board C, J102-40
J100-31		BLU-GRY	RGB106 BLU return to RGB LED Controller Board C, J102-38
J100-26		VIO	+4VDC from RGB LED Controller Board C, J102-45
J100-28		VIO-GRN	RGB107 GRN return to RGB LED Controller Board C, J102-48
J100-30		VIO-RED	RGB107 RED return to RGB LED Controller Board C, J102-46
J100-32		VIO-BLU	RGB107 BLU return to RGB LED Controller Board C, J102-44
J100-33		Not Used	
J100-34		Not Used	
J100-35		Not Used	
J100-36		Not Used	
J100-37		Not Used	
J100-38		Not Used	
J100-39		Not Used	
J100-40		Not Used	



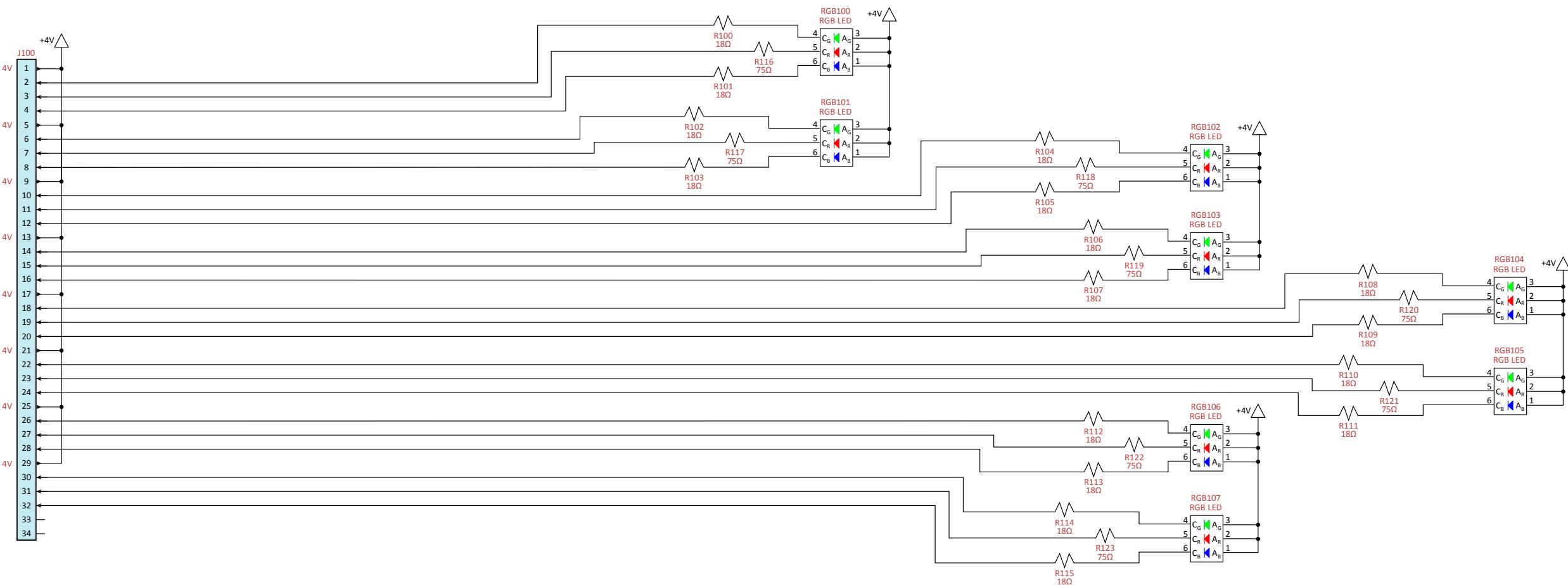
Hobbit Arkenstone RGB LED Board, 2.5mm

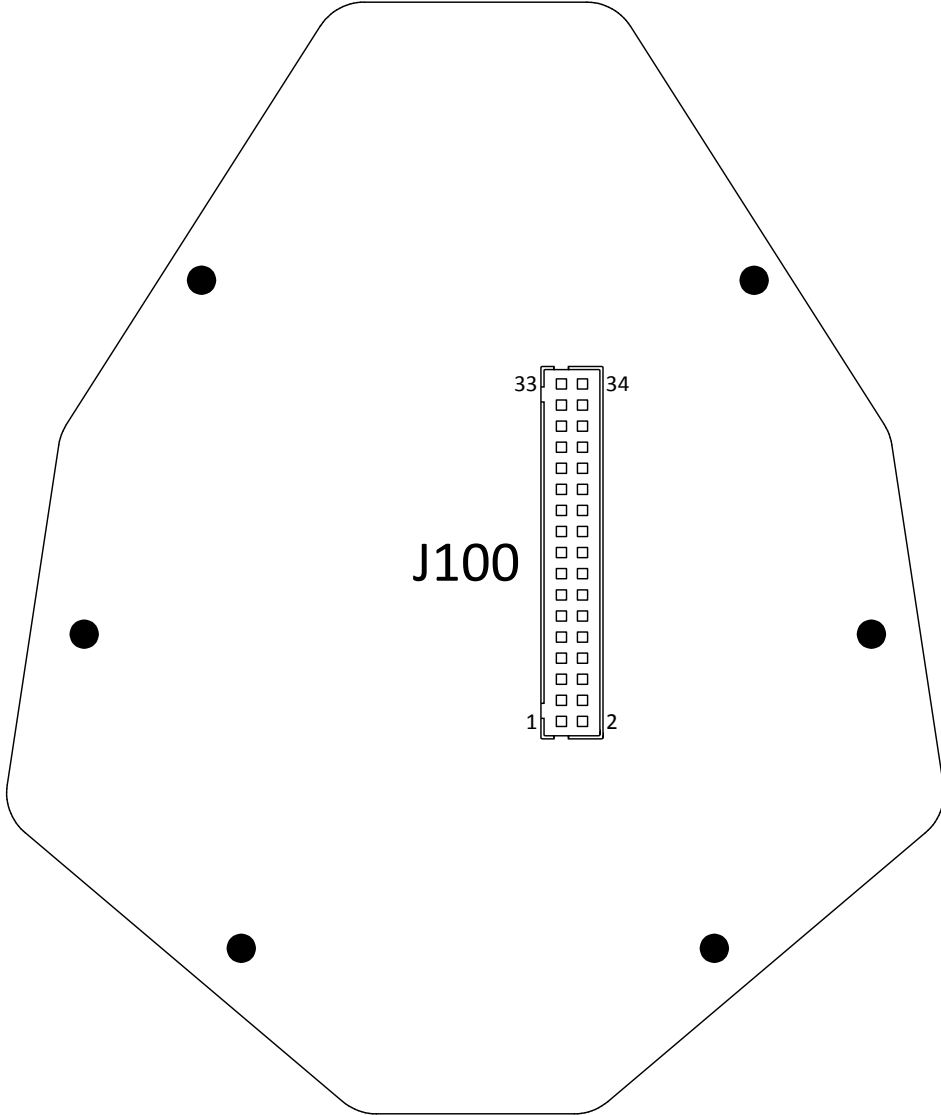
15-0032-01

(games manufactured on/after Aug 11, 2016)

Component(s)	Part Number	Description
R100-R115	122-0018-102	Resistor, 0603 SMT, 18Ω, 0.1W, 1%
R116-R123	120-0075-122	Resistor, 0805 SMT, 75Ω, 0.125W, 1%
RGB100-RGB107	24-0016-00	LED, SMT, High-Power RGB, 624/527/470nm
J100	30-2203-34	Header, Male, 34-Pin, 2 Rows, 2.5mm

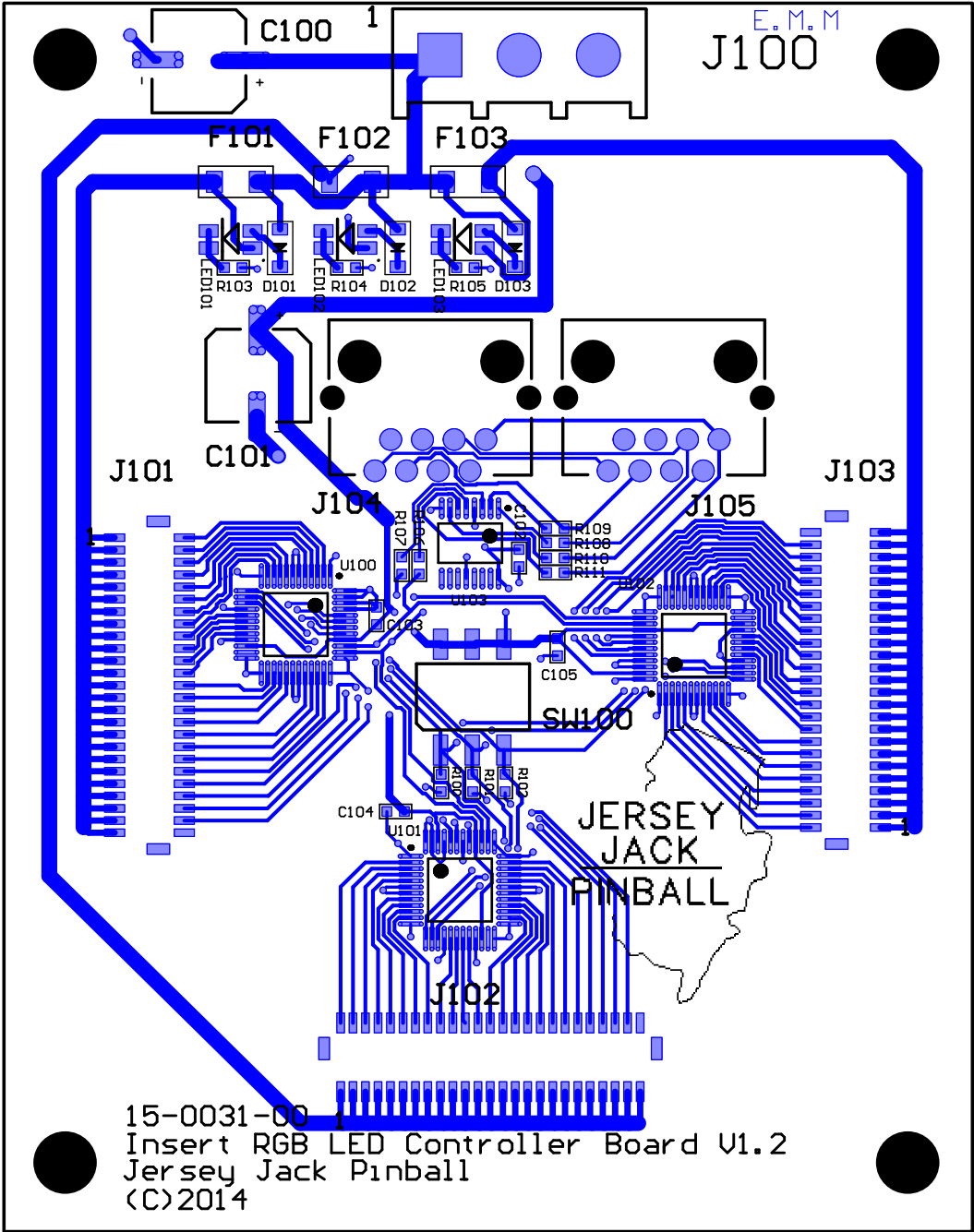
Hobbit Arkenstone RGB LED Board, 2.5mm
15-0032-01





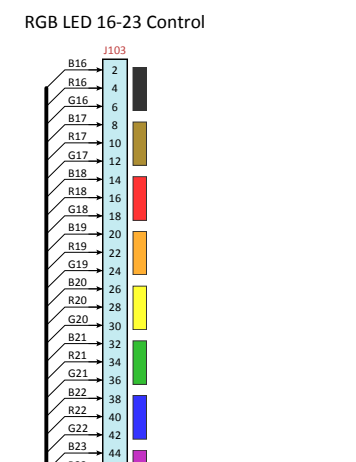
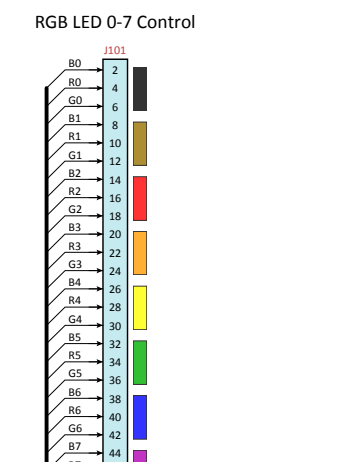
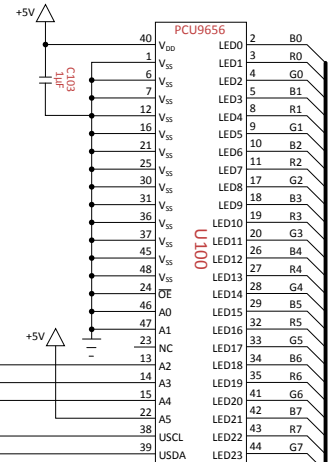
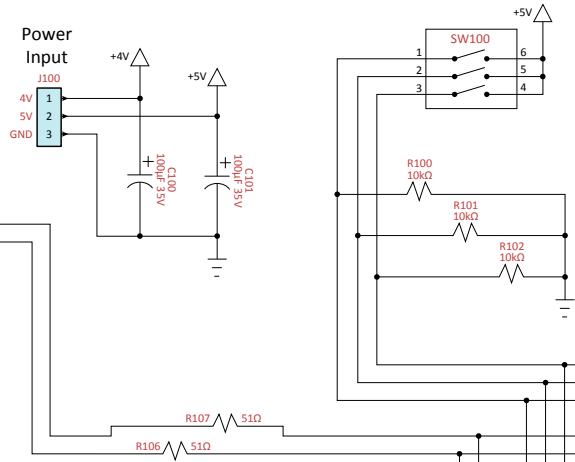
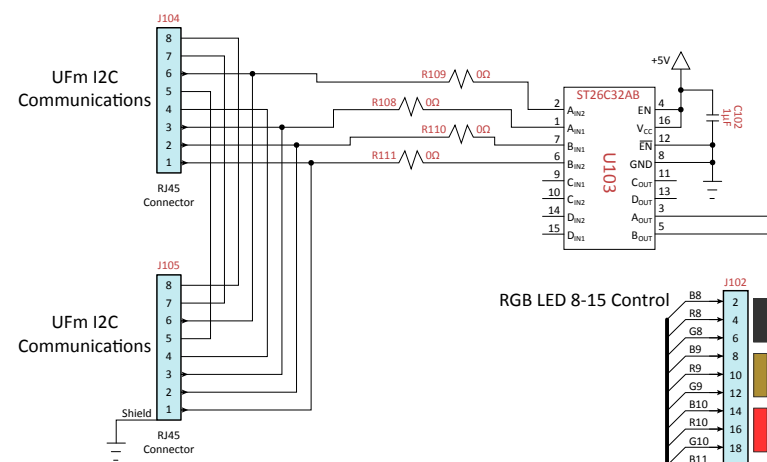
Hobbit Arkenstone RGB LED Board, 2.5mm
15-0032-01
Connector Pin-outs

<i>J100 RGB LED Control/Power Input (RGB Cable 19-3095-15)</i>			
J100-2		BLK	+4VDC from RGB LED Controller Board C, J102-3
J100-4		BLK-GRN	RGB100 GRN return to RGB LED Controller Board C, J102-6
J100-6		BLK-RED	RGB100 RED return to RGB LED Controller Board C, J102-4
J100-8		BLK-BLU	RGB100 BLU return to RGB LED Controller Board C, J102-2
J100-1		BRN	+4VDC from RGB LED Controller Board C, J102-9
J100-3		BRN-GRN	RGB101 GRN return to RGB LED Controller Board C, J102-12
J100-5		BRN-RED	RGB101 RED return to RGB LED Controller Board C, J102-10
J100-7		BRN-BLU	RGB101 BLU return to RGB LED Controller Board C, J102-8
J100-9		RED	+4VDC from RGB LED Controller Board C, J102-15
J100-11		RED-GRN	RGB102 GRN return to RGB LED Controller Board C, J102-18
J100-13		RED-GRY	RGB102 RED return to RGB LED Controller Board C, J102-16
J100-15		RED-BLU	RGB102 BLU return to RGB LED Controller Board C, J102-14
J100-10		ORN	+4VDC from RGB LED Controller Board C, J102-21
J100-12		ORN-GRN	RGB103 GRN return to RGB LED Controller Board C, J102-24
J100-14		ORN-RED	RGB103 RED return to RGB LED Controller Board C, J102-22
J100-16		ORN-BLU	RGB103 BLU return to RGB LED Controller Board C, J102-20
J100-18		YEL	+4VDC from RGB LED Controller Board C, J102-27
J100-20		YEL-GRN	RGB104 GRN return to RGB LED Controller Board C, J102-30
J100-22		YEL-RED	RGB104 RED return to RGB LED Controller Board C, J102-28
J100-24		YEL-BLU	RGB104 BLU return to RGB LED Controller Board C, J102-26
J100-17		GRN	+4VDC from RGB LED Controller Board C, J102-33
J100-19		GRN-GRY	RGB105 GRN return to RGB LED Controller Board C, J102-36
J100-21		GRN-RED	RGB105 RED return to RGB LED Controller Board C, J102-34
J100-23		GRN-BLU	RGB105 BLU return to RGB LED Controller Board C, J102-32
J100-25		BLU	+4VDC from RGB LED Controller Board C, J102-39
J100-27		BLU-GRN	RGB106 GRN return to RGB LED Controller Board C, J102-42
J100-29		BLU-RED	RGB106 RED return to RGB LED Controller Board C, J102-40
J100-31		BLU-GRY	RGB106 BLU return to RGB LED Controller Board C, J102-38
J100-26		VIO	+4VDC from RGB LED Controller Board C, J102-45
J100-28		VIO-GRN	RGB107 GRN return to RGB LED Controller Board C, J102-48
J100-30		VIO-RED	RGB107 RED return to RGB LED Controller Board C, J102-46
J100-32		VIO-BLU	RGB107 BLU return to RGB LED Controller Board C, J102-44
J100-33		Not Used	
J100-34		Not Used	

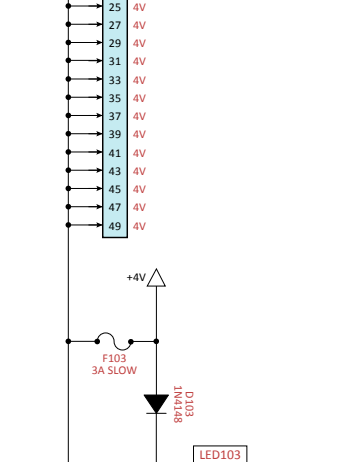
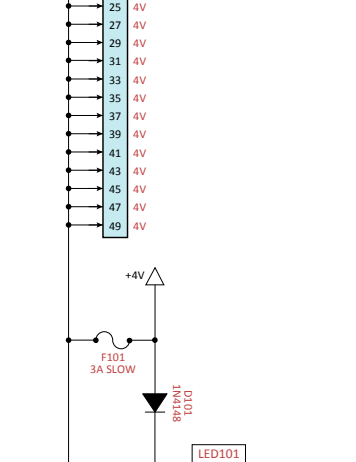
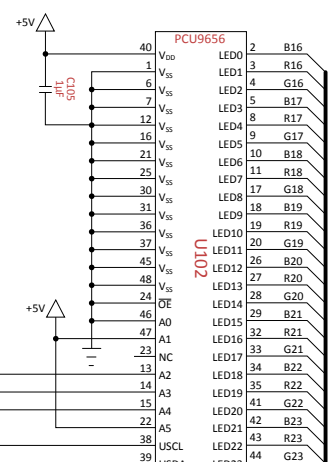
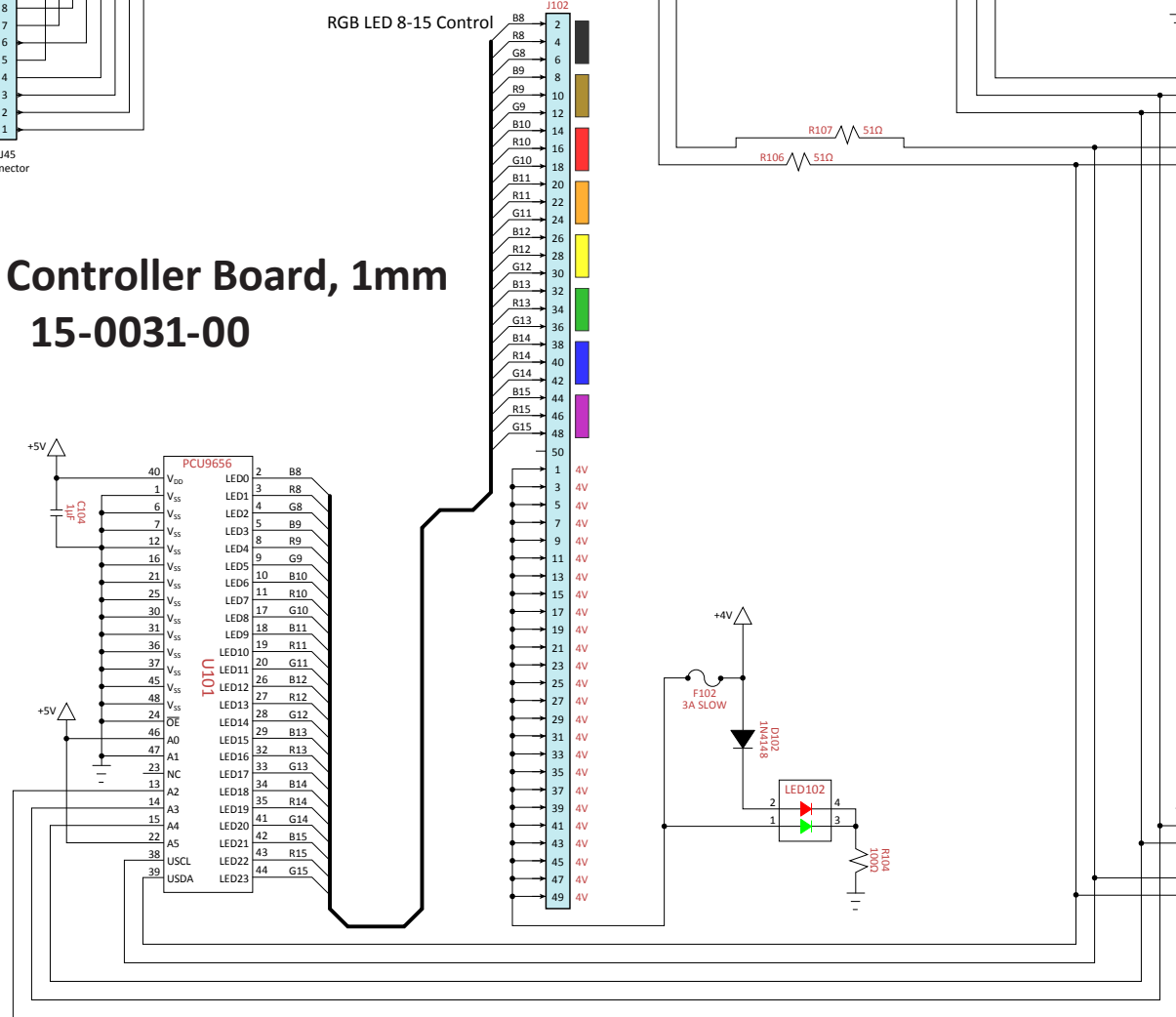


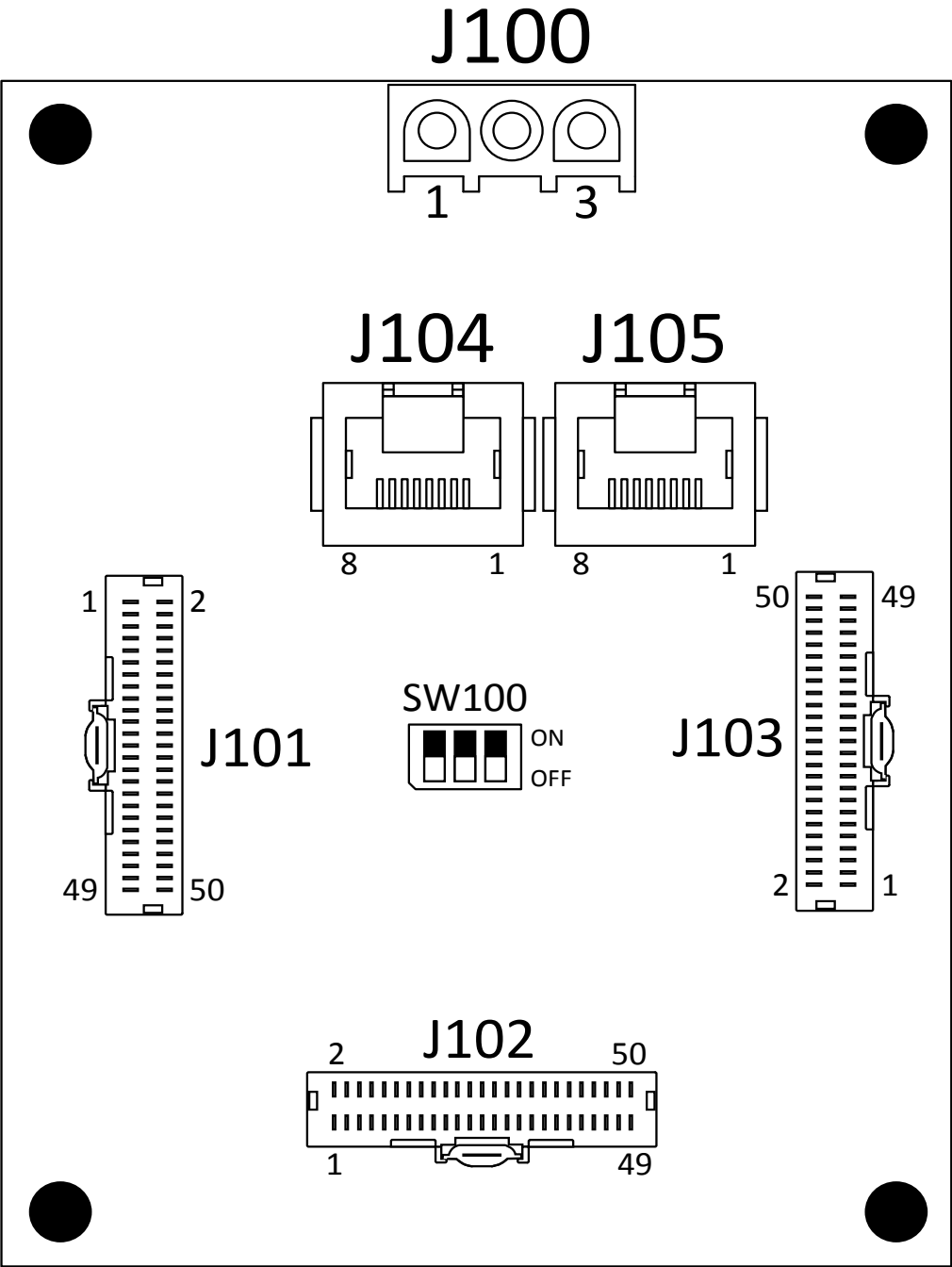
RGB LED Controller Board, 1mm
15-0031-00
(games manufactured before Aug 11, 2016)

Component(s)	Part Number	Description
C100, C101	109-100M-035	Capacitor, Elect (Radial), 100μF, 35V, 20%
C102-C105	103-105Z-016	Capacitor, MLCC, 0603 SMT, 1μF, 16V, +80%, -20%
D101-D103	110-1001-0S	Diode, 1N4148, SMT, 100V, 300mA
F101-F103	170-6303-SS	Fuse, Slow, 1206 SMT, 3A, 63V
LED101-LED103	24-0020-0S	LED, 1210 SMD, RED/GRN, 569/621nm
R100-R102	122-10K0-104	Resistor, 0603 SMT, 10kΩ, 0.1W, 5%
R103-R105	122-0100-104	Resistor, 0603 SMT, 100Ω, 0.1W, 5%
R106, R107	122-51P1-102	Resistor, 0603 SMT, 51.1Ω, 0.1W, 1%
R108-R111	122-0000-100	Resistor, 0603 SMT, 0Ω
SW100	18-8003-0S	Switch, DIP, 3-pos, 2.54mm
U100-U102	140-0005-0S	LED Driver, I2C-Bus, 24-Bit, 5MHz, PCU9656, LQFP-48 SMT
U103	141-0020-0S	Quad Diff Line Rcvr w/3-State Outputs, ST26C32AB, TSSOP-16 SMT
J100	30-2005-03	Header, Male, 3-pin, 6.35mm
J101-J103	30-2200-50	Header, SMT, Male, 50-Pin, 1mm
J104, J105	30-2510-01	Jack Header, w/Shield, RJ45 (Ethernet)



RGB LED Controller Board, 1mm 15-0031-00





RGB LED Controller Board A
15-0031-00 (1mm)
Connector Pin-outs

J100 Power Input

J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply
J100-2	RED	+5VDC from Primary ATX Pwr Supply
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply

J101 Upper Right RGB LED Control (RGB Cable 19-3095-01)

RGB LED 25 [Bilbo Arrow]

J101-2	BLK-BLU	RGB100 BLU return from Double RGB LED Board 25/26, J100-5
J101-4	BLK-RED	RGB100 RED return from Double RGB LED Board 25/26, J100-6
J101-6	BLK-GRN	RGB100 GRN return from Double RGB LED Board 25/26, J100-7
J101-3	BLK	+4VDC to Double RGB LED Board 25/26, J100-8

RGB LED 26 [Bilbo Parchment]

J101-8	BRN-BLU	RGB101 BLU return from Double RGB LED Board 25/26, J100-1
J101-10	BRN-RED	RGB101 RED return from Double RGB LED Board 25/26, J100-2
J101-12	BRN-GRN	RGB101 GRN return from Double RGB LED Board 25/26, J100-3
J101-9	BRN	+4VDC to Double RGB LED Board 25/26, J100-4

RGB LED 27 [Mystery]

J101-14	RED-BLU	RGB100 BLU return from Double RGB LED Board 27/28, J100-5
J101-16	RED-GRY	RGB100 RED return from Double RGB LED Board 27/28, J100-6
J101-18	RED-GRN	RGB100 GRN return from Double RGB LED Board 27/28, J100-7
J101-15	RED	+4VDC to Double RGB LED Board 27/28, J100-8

RGB LED 28 [Bag End]





J101-20	ORN-BLU	RGB101 BLU return from Double RGB LED Board 27/28, J100-1
J101-22	ORN-RED	RGB101 RED return from Double RGB LED Board 27/28, J100-2
J101-24	ORN-GRN	RGB101 GRN return from Double RGB LED Board 27/28, J100-3
J101-21	ORN	+4VDC to Double RGB LED Board 27/28, J100-4

RGB LED 29 [Pop Bumpers, Lower]





J101-26	YEL-BLU	RGB100 BLU return from Single RGB LED Board 29, J100-4
J101-28	YEL-RED	RGB100 RED return from Single RGB LED Board 29, J100-3
J101-30	YEL-GRN	RGB100 GRN return from Single RGB LED Board 29, J100-2
J101-27	YEL	+4VDC to Single RGB LED Board 29, J100-1

J101 Upper Right RGB LED Control (RGB Cable 19-3095-01, cont.)

RGB LED 30 [Pop Bumpers, Right]

J101-32		GRN-BLU	RGB100 BLU return from Single RGB LED Board 30, J100-4
J101-34		GRN-RED	RGB100 RED return from Single RGB LED Board 30, J100-3
J101-36		GRN-GRY	RGB100 GRN return from Single RGB LED Board 30, J100-2
J101-33		GRN	+4VDC to Single RGB LED Board 30, J100-1





RGB LED 31 [Pop Bumpers, Left]

J101-38		BLU-GRY	RGB100 BLU return from Single RGB LED Board 31, J100-4
J101-40		BLU-RED	RGB100 RED return from Single RGB LED Board 31, J100-3
J101-42		BLU-GRN	RGB100 GRN return from Single RGB LED Board 31, J100-2
J101-39		BLU	+4VDC to Single RGB LED Board 31, J100-1





J101-44	Not Used
J101-46	Not Used
J101-48	Not Used
J101-45	Not Used
J101-1	Not Used
J101-5	Not Used
J101-7	Not Used
J101-11	Not Used
J101-13	Not Used
J101-17	Not Used
J101-19	Not Used
J101-23	Not Used
J101-25	Not Used
J101-29	Not Used
J101-31	Not Used
J101-35	Not Used
J101-37	Not Used
J101-41	Not Used
J101-43	Not Used
J101-47	Not Used
J101-49	Not Used
J101-50	Not Used

J102 Upper Left RGB LED Control (RGB Cable 19-3095-02)





RGB LED 33 [Balin, Left]

J102-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 33/34, J100-5
J102-4		BLK-RED	RGB100 RED return from Double RGB LED Board 33/34, J100-6
J102-6		BLK-GRN	RGB100 GRN return from Double RGB LED Board 33/34, J100-7
J102-3		BLK	+4VDC to Double RGB LED Board 33/34, J100-8





RGB LED 34 [Balin, Right]

J102-8		BRN-BLU	RGB101 BLU return from Double RGB LED Board 33/34, J100-1
J102-10		BRN-RED	RGB101 RED return from Double RGB LED Board 33/34, J100-2
J102-12		BRN-GRN	RGB101 GRN return from Double RGB LED Board 33/34, J100-3
J102-9		BRN	+4VDC to Double RGB LED Board 33/34, J100-4





RGB LED 35 [Bombur]

J102-14		RED-BLU	RGB100 BLU return from Triple RGB LED Board 35/36/37, J100-9
J102-16		RED-GRY	RGB100 RED return from Triple RGB LED Board 35/36/37, J100-10
J102-18		RED-GRN	RGB100 GRN return from Triple RGB LED Board 35/36/37, J100-11
J102-15		RED	+4VDC to Triple RGB LED Board 35/36/37, J100-12





RGB LED 36 [Bofur]

J102-20		ORN-BLU	RGB101 BLU return from Triple RGB LED Board 35/36/37, J100-5
J102-22		ORN-RED	RGB101 RED return from Triple RGB LED Board 35/36/37, J100-6
J102-24		ORN-GRN	RGB101 GRN return from Triple RGB LED Board 35/36/37, J100-7
J102-21		ORN	+4VDC to Triple RGB LED Board 35/36/37, J100-8





RGB LED 37 [Bifur]

J102-26		YEL-GRN	RGB102 BLU return from Triple RGB LED Board 35/36/37, J100-1
J102-28		YEL-RED	RGB102 RED return from Triple RGB LED Board 35/36/37, J100-2
J102-30		YEL-BLU	RGB102 GRN return from Triple RGB LED Board 35/36/37, J100-3
J102-27		YEL	+4VDC to Triple RGB LED Board 35/36/37, J100-4





RGB LED 38 [Smaug Pillar]

J102-32		GRN-BLU	RGB100 BLU return from Single RGB LED Board 38, J100-4
J102-34		GRN-RED	RGB100 RED return from Single RGB LED Board 38, J100-3
J102-36		GRN-GRY	RGB100 GRN return from Single RGB LED Board 38, J100-2
J102-33		GRN	+4VDC to Single RGB LED Board 38, J100-1

RGB LED 39 [Smaug Gold Pile]

J102-38		BLU-GRY	RGB100 BLU return from Single RGB LED Board 39, J100-4
J102-40		BLU-RED	RGB100 RED return from Single RGB LED Board 39, J100-3
J102-42		BLU-GRN	RGB100 GRN return from Single RGB LED Board 39, J100-2
J102-39		BLU	+4VDC to Single RGB LED Board 39, J100-1

RGB LED 40 [Smaug Mouth]

J102-44		VIO-BLU	RGB100 BLU return from Single RGB LED Board 40, J100-4
J102-46		VIO-RED	RGB100 RED return from Single RGB LED Board 40, J100-3
J102-48		VIO-GRN	RGB100 GRN return from Single RGB LED Board 40, J100-2
J102-45		VIO	+4VDC to Single RGB LED Board 40, J100-1


J102-1	Not Used
J102-5	Not Used
J102-7	Not Used
J102-11	Not Used
J102-13	Not Used
J102-17	Not Used

J102 Upper Left RGB LED Control (RGB Cable 19-3095-02, cont.)


J102-19	Not Used
J102-23	Not Used
J102-25	Not Used
J102-29	Not Used
J102-31	Not Used
J102-35	Not Used
J102-37	Not Used
J102-41	Not Used
J102-43	Not Used
J102-47	Not Used
J102-49	Not Used
J102-50	Not Used

J103 Upper Middle RGB LED Control (RGB Cable 19-3095-03)


RGB LED 41 [Gandalf Parchment]

J103-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 41/42, J100-5
J103-4		BLK-RED	RGB100 RED return from Double RGB LED Board 41/42, J100-6
J103-6		BLK-GRN	RGB100 GRN return from Double RGB LED Board 41/42, J100-7
J103-3		BLK	+4VDC to Double RGB LED Board 41/42, J100-8


RGB LED 42 [Gandalf Arrow]

J103-8		BRN-BLU	RGB101 BLU return from Double RGB LED Board 41/42, J100-1
J103-10		BRN-RED	RGB101 RED return from Double RGB LED Board 41/42, J100-2
J103-12		BRN-GRN	RGB101 GRN return from Double RGB LED Board 41/42, J100-3
J103-9		BRN	+4VDC to Double RGB LED Board 41/42, J100-4


RGB LED 43 [Bilbo Ramp **MODE** Cut-out]

J103-14		RED-BLU	RGB100 BLU return from Double RGB LED Board 43/44, J100-5
J103-16		RED-GRY	RGB100 RED return from Double RGB LED Board 43/44, J100-6
J103-18		RED-GRN	RGB100 GRN return from Double RGB LED Board 43/44, J100-7
J103-15		RED	+4VDC to Double RGB LED Board 43/44, J100-8


RGB LED 44 [Bilbo Ramp **LOCK** Cut-out]

J103-20		ORN-BLU	RGB101 BLU return from Double RGB LED Board 43/44, J100-1
J103-22		ORN-RED	RGB101 RED return from Double RGB LED Board 43/44, J100-2
J103-24		ORN-GRN	RGB101 GRN return from Double RGB LED Board 43/44, J100-3
J103-21		ORN	+4VDC to Double RGB LED Board 43/44, J100-4


RGB LED 45 [Key]

J103-26		YEL-BLU	RGB100 BLU return from Single RGB LED Board 45, J100-4
J103-28		YEL-RED	RGB100 RED return from Single RGB LED Board 45, J100-3
J103-30		YEL-GRN	RGB100 GRN return from Single RGB LED Board 45, J100-2
J103-27		YEL	+4VDC to Single RGB LED Board 45, J100-1


RGB LED 46 [Gandalf Ramp **BOOK** Cut-out]

J103-32		GRN-BLU	RGB100 BLU return from Double RGB LED Board 46/47, J100-5
J103-34		GRN-RED	RGB100 RED return from Double RGB LED Board 46/47, J100-6
J103-36		GRN-GRY	RGB100 GRN return from Double RGB LED Board 46/47, J100-7
J103-33		GRN	+4VDC to Double RGB LED Board 46/47, J100-8

RGB LED 47 [Gandalf Ramp **TIME** Cut-out]

J103-38		BLU-GRY	RGB101 BLU return from Double RGB LED Board 46/47, J100-1
J103-40		BLU-RED	RGB101 RED return from Double RGB LED Board 46/47, J100-2
J103-42		BLU-GRN	RGB101 GRN return from Double RGB LED Board 46/47, J100-3
J103-39		BLU	+4VDC to Double RGB LED Board 46/47, J100-4

RGB LED 48 [Ring Button Light]

J103-44		VIO-BLU	RGB100 BLU return from Single RGB LED Board 48, J100-4, thru 6-pin inline connector
J103-46		VIO-RED	RGB100 RED return from Single RGB LED Board 48, J100-3, thru 6-pin inline connector
J103-48		VIO-GRN	RGB100 GRN return from Single RGB LED Board 48, J100-2, thru 6-pin inline connector
J103-45		VIO	+4VDC to Single RGB LED Board 48, J100-1, thru 6-pin inline connector

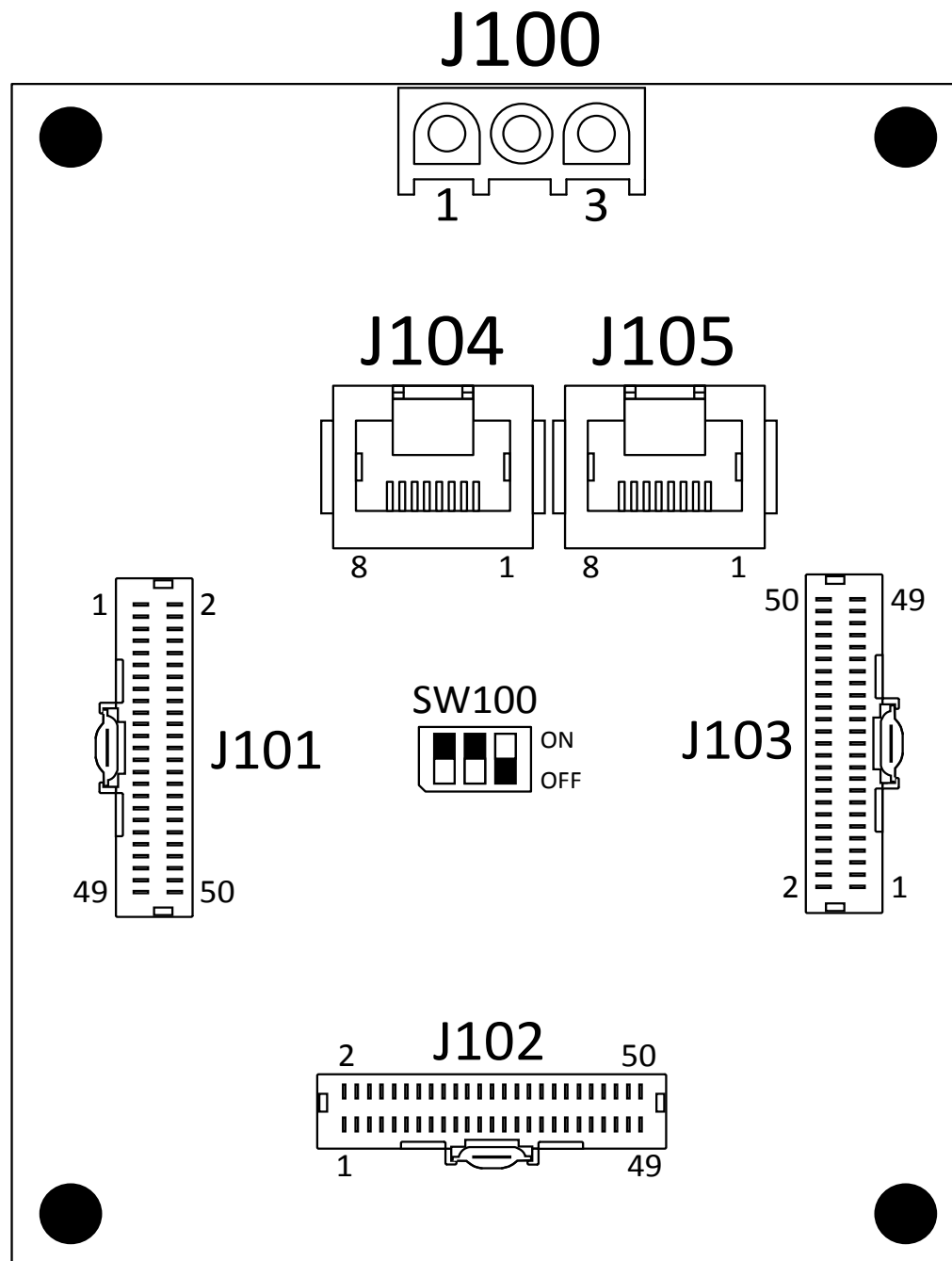
J103-1	Not Used
J103-5	Not Used
J103-7	Not Used
J103-11	Not Used
J103-13	Not Used
J103-17	Not Used
J103-19	Not Used
J103-23	Not Used
J103-25	Not Used
J103-29	Not Used
J103-31	Not Used
J103-35	Not Used
J103-37	Not Used
J103-41	Not Used
J103-43	Not Used
J103-47	Not Used
J103-49	Not Used
J103-50	Not Used

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from RGB LED Controller Bd C, J105

J105 UFM I2C Communications

Not Used



RGB LED Controller Board B 15-0031-00 (1mm) Connector Pin-outs

J100 Power Input

J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply
J100-2	RED	+5VDC from Primary ATX Pwr Supply (jumped from RGB LED Controller Bd A, J100-2)
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply

J101 Middle Left RGB LED Control (RGB Cable 19-3095-04)

RGB LED 49 [Gloin]

J101-2	BLK-BLU	RGB100 BLU return from Triple RGB LED Board 49/50/51, J100-9
J101-4	BLK-RED	RGB100 RED return from Triple RGB LED Board 49/50/51, J100-10
J101-6	BLK-GRN	RGB100 GRN return from Triple RGB LED Board 49/50/51, J100-11
J101-3	BLK	+4VDC to Triple RGB LED Board 49/50/51, J100-12

RGB LED 50 [Oin]

J101-8	BRN-BLU	RGB101 BLU return from Triple RGB LED Board 49/50/51, J100-5
J101-10	BRN-RED	RGB101 RED return from Triple RGB LED Board 49/50/51, J100-6
J101-12	BRN-GRN	RGB101 GRN return from Triple RGB LED Board 49/50/51, J100-7
J101-9	BRN	+4VDC to Triple RGB LED Board 49/50/51, J100-8

RGB LED 51 [Dwalin]

J101-14	RED-BLU	RGB102 BLU return from Triple RGB LED Board 49/50/51, J100-1
J101-16	RED-GRY	RGB102 RED return from Triple RGB LED Board 49/50/51, J100-2
J101-18	RED-GRN	RGB102 GRN return from Triple RGB LED Board 49/50/51, J100-3
J101-15	RED	+4VDC to Triple RGB LED Board 49/50/51, J100-4

RGB LED 52 [EXTRA BALL]


J101-20	ORN-BLU	RGB100 BLU return from Triple RGB LED Board 52/53/54, J100-9
J101-22	ORN-RED	RGB100 RED return from Triple RGB LED Board 52/53/54, J100-10
J101-24	ORN-GRN	RGB100 GRN return from Triple RGB LED Board 52/53/54, J100-11
J101-21	ORN	+4VDC to Triple RGB LED Board 52/53/54, J100-12

RGB LED 53 [Balin Parchment]


J101-26	YEL-BLU	RGB101 BLU return from Triple RGB LED Board 52/53/54, J100-5
J101-28	YEL-RED	RGB101 RED return from Triple RGB LED Board 52/53/54, J100-6
J101-30	YEL-GRN	RGB101 GRN return from Triple RGB LED Board 52/53/54, J100-7
J101-27	YEL	+4VDC to Triple RGB LED Board 52/53/54, J100-8

J101 Middle Left RGB LED Control (RGB Cable 19-3095-04, cont.)


RGB LED 54 [Balin Arrow]

J101-32		GRN-BLU	RGB102 BLU return from Triple RGB LED Board 52/53/54, J100-1
J101-34		GRN-RED	RGB102 RED return from Triple RGB LED Board 52/53/54, J100-2
J101-36		GRN-GRY	RGB102 GRN return from Triple RGB LED Board 52/53/54, J100-3
J101-33		GRN	+4VDC to Triple RGB LED Board 52/53/54, J100-4

RGB LED 55 [Fili Parchment]

J101-38		BLU-GRY	RGB100 BLU return from Double RGB LED Board 55/56, J100-5
J101-40		BLU-RED	RGB100 RED return from Double RGB LED Board 55/56, J100-6
J101-42		BLU-GRN	RGB100 GRN return from Double RGB LED Board 55/56, J100-7
J101-39		BLU	+4VDC to Double RGB LED Board 55/56, J100-8


RGB LED 56 [Fili Arrow]

J101-44		VIO-BLU	RGB101 BLU return from Double RGB LED Board 55/56, J100-1
J101-46		VIO-RED	RGB101 RED return from Double RGB LED Board 55/56, J100-2
J101-48		VIO-GRN	RGB101 GRN return from Double RGB LED Board 55/56, J100-3
J101-45		VIO	+4VDC to Double RGB LED Board 55/56, J100-4


J101-1		Not Used
J101-5		Not Used
J101-7		Not Used
J101-11		Not Used
J101-13		Not Used
J101-17		Not Used
J101-19		Not Used
J101-23		Not Used
J101-25		Not Used
J101-29		Not Used
J101-31		Not Used
J101-35		Not Used
J101-37		Not Used
J101-41		Not Used
J101-43		Not Used
J101-47		Not Used
J101-49		Not Used
J101-50		Not Used

J102 Lower Middle RGB LED Control (RGB Cable 19-3095-05)


RGB LED 57 [Shoot Again]

J102-2		BLK-BLU	RGB100 BLU return from Arkenstone RGB LED Board, J100-8
J102-4		BLK-RED	RGB100 RED return from Arkenstone RGB LED Board, J100-6
J102-6		BLK-GRN	RGB100 GRN return from Arkenstone RGB LED Board, J100-4
J102-3		BLK	+4VDC to Arkenstone RGB LED Board, J100-2


RGB LED 58 [Lock 1]

J102-8		BRN-BLU	RGB101 BLU return from Arkenstone RGB LED Board, J100-7
J102-10		BRN-RED	RGB101 RED return from Arkenstone RGB LED Board, J100-5
J102-12		BRN-GRN	RGB101 GRN return from Arkenstone RGB LED Board, J100-3
J102-9		BRN	+4VDC to Arkenstone RGB LED Board, J100-1


RGB LED 59 [Lock 2]

J102-14		RED-BLU	RGB102 BLU return from Arkenstone RGB LED Board, J100-15
J102-16		RED-GRY	RGB102 RED return from Arkenstone RGB LED Board, J100-13
J102-18		RED-GRN	RGB102 GRN return from Arkenstone RGB LED Board, J100-11
J102-15		RED	+4VDC to Arkenstone RGB LED Board, J100-9


RGB LED 60 [Barrel Escape]

J102-20		ORN-BLU	RGB103 BLU return from Arkenstone RGB LED Board, J100-16
J102-22		ORN-RED	RGB103 RED return from Arkenstone RGB LED Board, J100-14
J102-24		ORN-GRN	RGB103 GRN return from Arkenstone RGB LED Board, J100-12
J102-21		ORN	+4VDC to Arkenstone RGB LED Board, J100-10


RGB LED 61 [Into The Fire]

J102-26		YEL-GRN	RGB104 BLU return from Arkenstone RGB LED Board, J100-24
J102-28		YEL-RED	RGB104 RED return from Arkenstone RGB LED Board, J100-22
J102-30		YEL-BLU	RGB104 GRN return from Arkenstone RGB LED Board, J100-20
J102-27		YEL	+4VDC to Arkenstone RGB LED Board, J100-18


RGB LED 62 [Super X]

J102-32		GRN-BLU	RGB105 BLU return from Arkenstone RGB LED Board, J100-23
J102-34		GRN-RED	RGB105 RED return from Arkenstone RGB LED Board, J100-21
J102-36		GRN-GRY	RGB105 GRN return from Arkenstone RGB LED Board, J100-19
J102-33		GRN	+4VDC to Arkenstone RGB LED Board, J100-17

RGB LED 63 [Battle Of Five Armies]

J102-38		BLU-GRY	RGB106 BLU return from Arkenstone RGB LED Board, J100-31
J102-40		BLU-RED	RGB106 RED return from Arkenstone RGB LED Board, J100-29
J102-42		BLU-GRN	RGB106 GRN return from Arkenstone RGB LED Board, J100-27
J102-39		BLU	+4VDC to Arkenstone RGB LED Board, J100-25

RGB LED 64 [Arkenstone]

J102-44		VIO-BLU	RGB107 BLU return from Arkenstone RGB LED Board, J100-32
J102-46		VIO-RED	RGB107 RED return from Arkenstone RGB LED Board, J100-30
J102-48		VIO-GRN	RGB107 GRN return from Arkenstone RGB LED Board, J100-28
J102-45		VIO	+4VDC to Arkenstone RGB LED Board, J100-26


J102-1		Not Used
J102-5		Not Used
J102-7		Not Used
J102-11		Not Used
J102-13		Not Used
J102-17		Not Used

J102 Lower Middle RGB LED Control (RGB Cable 19-3095-05, cont.)


J102-19	Not Used
J102-23	Not Used
J102-25	Not Used
J102-29	Not Used
J102-31	Not Used
J102-35	Not Used
J102-37	Not Used
J102-41	Not Used
J102-43	Not Used
J102-47	Not Used
J102-49	Not Used
J102-50	Not Used

J103 Lower Left RGB LED Control (RGB Cable 19-3095-06)


RGB LED 65 [Spider Pop-Up Parchment]

J103-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 65/66, J100-5
J103-4		BLK-RED	RGB100 RED return from Double RGB LED Board 65/66, J100-6
J103-6		BLK-GRN	RGB100 GRN return from Double RGB LED Board 65/66, J100-7
J103-3		BLK	+4VDC to Double RGB LED Board 65/66, J100-8


RGB LED 66 [Spider Pop-Up Arrow]

J103-8		BRN-BLU	RGB101 BLU return from Double RGB LED Board 65/66, J100-1
J103-10		BRN-RED	RGB101 RED return from Double RGB LED Board 65/66, J100-2
J103-12		BRN-GRN	RGB101 GRN return from Double RGB LED Board 65/66, J100-3
J103-9		BRN	+4VDC to Double RGB LED Board 65/66, J100-4


RGB LED 67 [Kickback]

J103-14		RED-BLU	RGB100 BLU return from Double RGB LED Board 67/68, J100-5
J103-16		RED-GRY	RGB100 RED return from Double RGB LED Board 67/68, J100-6
J103-18		RED-GRN	RGB100 GRN return from Double RGB LED Board 67/68, J100-7
J103-15		RED	+4VDC to Double RGB LED Board 67/68, J100-8


RGB LED 68 [Load Arrow]

J103-20		ORN-BLU	RGB101 BLU return from Double RGB LED Board 67/68, J100-1
J103-22		ORN-RED	RGB101 RED return from Double RGB LED Board 67/68, J100-2
J103-24		ORN-GRN	RGB101 GRN return from Double RGB LED Board 67/68, J100-3
J103-21		ORN	+4VDC to Double RGB LED Board 67/68, J100-4


RGB LED 69 [Return Lane Orc]

J103-26		YEL-BLU	RGB100 BLU return from Double RGB LED Board 69/70, J100-5
J103-28		YEL-RED	RGB100 RED return from Double RGB LED Board 69/70, J100-6
J103-30		YEL-GRN	RGB100 GRN return from Double RGB LED Board 69/70, J100-7
J103-27		YEL	+4VDC to Double RGB LED Board 69/70, J100-8

RGB LED 70 [Return Lane Warg]

J103-32		GRN-BLU	RGB101 BLU return from Double RGB LED Board 69/70, J100-1
J103-34		GRN-RED	RGB101 RED return from Double RGB LED Board 69/70, J100-2
J103-36		GRN-GRY	RGB101 GRN return from Double RGB LED Board 69/70, J100-3
J103-33		GRN	+4VDC to Double RGB LED Board 69/70, J100-4

RGB LED 71 [Light Mystery, Left]

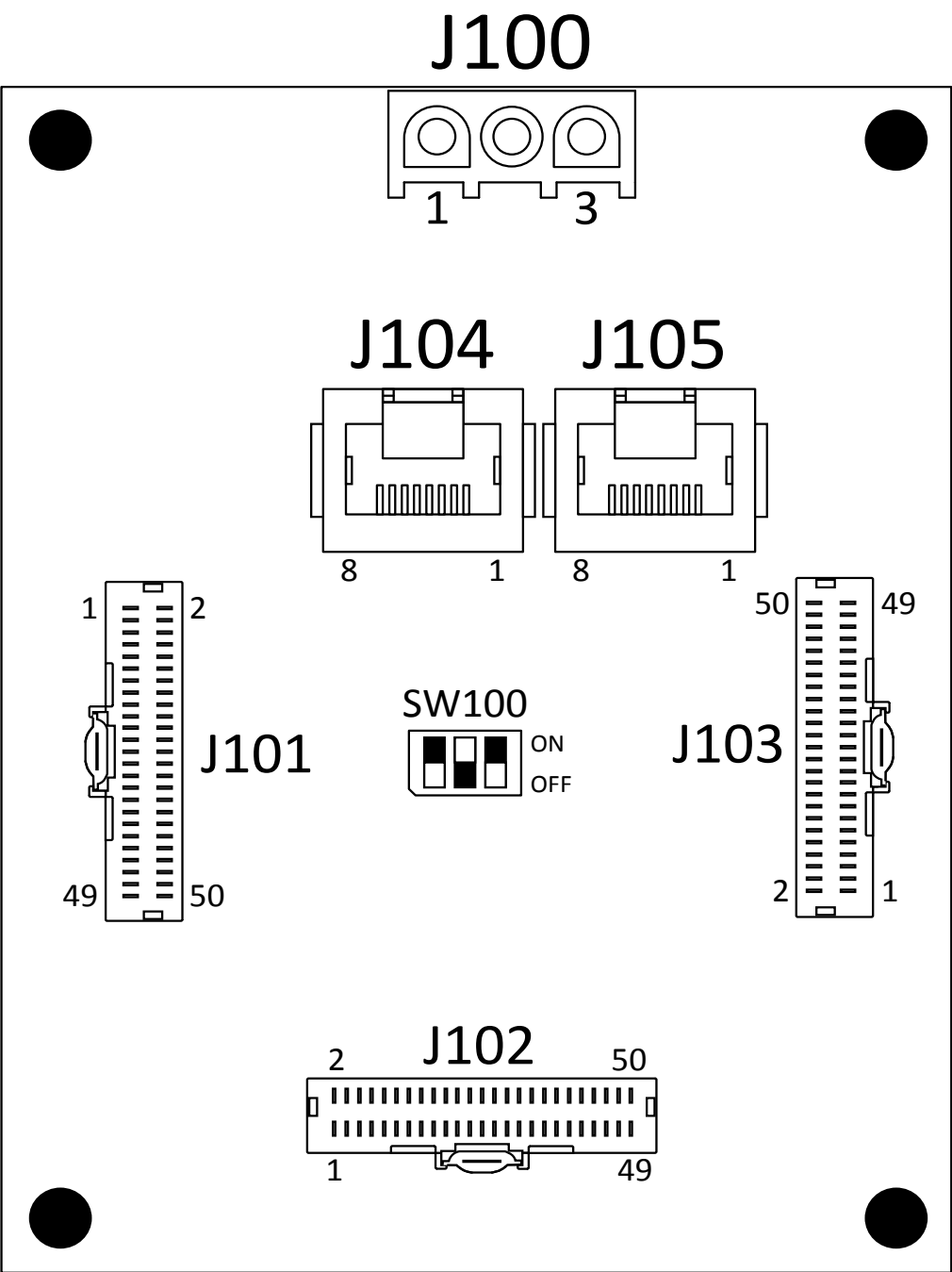
J103-38		BLU-GRY	RGB100 BLU return from Single RGB LED Board 71, J100-4
J103-40		BLU-RED	RGB100 RED return from Single RGB LED Board 71, J100-3
J103-42		BLU-GRN	RGB100 GRN return from Single RGB LED Board 71, J100-2
J103-39		BLU	+4VDC to Single RGB LED Board 71, J100-1
J103-44		Not Used	
J103-46		Not Used	
J103-48		Not Used	
J103-45		Not Used	
J103-1		Not Used	
J103-5		Not Used	
J103-7		Not Used	
J103-11		Not Used	
J103-13		Not Used	
J103-17		Not Used	
J103-19		Not Used	
J103-23		Not Used	
J103-25		Not Used	
J103-29		Not Used	
J103-31		Not Used	
J103-35		Not Used	
J103-37		Not Used	
J103-41		Not Used	
J103-43		Not Used	
J103-47		Not Used	
J103-49		Not Used	
J103-50		Not Used	

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from BAG Controller Bd, J103

J105 UFM I2C Communications

CAT5 or higher Ethernet cable to RGB LED Controller Bd C, J104



RGB LED Controller Board C
15-0031-00 (1mm)
Connector Pin-outs

J100 Power Input

J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply (jumped from RGB LED Controller Bd B, J100-1)
J100-2	RED	+5VDC from Primary ATX Pwr Supply (jumped from BAG Controller Bd, J100-3)
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply (jumped from RGB LED Controller Bd B, J100-3)

J101 Lower Right RGB LED Control (RGB Cable 19-3095-07)

RGB LED 73 [Warg Pop-Up Parchment]

J101-2	BLK-BLU	RGB100 BLU return from Double RGB LED Board 73/74, J100-5
J101-4	BLK-RED	RGB100 RED return from Double RGB LED Board 73/74, J100-6
J101-6	BLK-GRN	RGB100 GRN return from Double RGB LED Board 73/74, J100-7
J101-3	BLK	+4VDC to Double RGB LED Board 73/74, J100-8

RGB LED 74 [Warg Pop-Up Arrow]

J101-8	BRN-BLU	RGB101 BLU return from Double RGB LED Board 73/74, J100-1
J101-10	BRN-RED	RGB101 RED return from Double RGB LED Board 73/74, J100-2
J101-12	BRN-GRN	RGB101 GRN return from Double RGB LED Board 73/74, J100-3
J101-9	BRN	+4VDC to Double RGB LED Board 73/74, J100-4

RGB LED 75 [LOCK Rollover]

J101-14	RED-BLU	RGB100 BLU return from Single RGB LED Board 75, J100-4
J101-16	RED-GRY	RGB100 RED return from Single RGB LED Board 75, J100-3
J101-18	RED-GRN	RGB100 GRN return from Single RGB LED Board 75, J100-2
J101-15	RED	+4VDC to Single RGB LED Board 75, J100-1

RGB LED 76 [LOCK Rollover]


J101-20	ORN-BLU	RGB100 BLU return from Single RGB LED Board 76, J100-4
J101-22	ORN-RED	RGB100 RED return from Single RGB LED Board 76, J100-3
J101-24	ORN-GRN	RGB100 GRN return from Single RGB LED Board 76, J100-2
J101-21	ORN	+4VDC to Single RGB LED Board 76, J100-1

RGB LED 77 [Return Lane Spider]


J101-26	YEL-BLU	RGB100 BLU return from Double RGB LED Board 77/78, J100-5
J101-28	YEL-RED	RGB100 RED return from Double RGB LED Board 77/78, J100-6
J101-30	YEL-GRN	RGB100 GRN return from Double RGB LED Board 77/78, J100-7
J101-27	YEL	+4VDC to Double RGB LED Board 77/78, J100-8

J101 Lower Right RGB LED Control (RGB Cable 19-3095-07, cont.)


RGB LED 78 [Return Lane Goblin]

J101-32		GRN-BLU	RGB101 BLU return from Double RGB LED Board 77/78, J100-1
J101-34		GRN-RED	RGB101 RED return from Double RGB LED Board 77/78, J100-2
J101-36		GRN-GRY	RGB101 GRN return from Double RGB LED Board 77/78, J100-3
J101-33		GRN	+4VDC to Double RGB LED Board 77/78, J100-4

RGB LED 79 [Precioussss]


J101-38		BLU-GRY	RGB100 BLU return from Single RGB LED Board 79, J100-4
J101-40		BLU-RED	RGB100 RED return from Single RGB LED Board 79, J100-3
J101-42		BLU-GRN	RGB100 GRN return from Single RGB LED Board 79, J100-2
J101-39		BLU	+4VDC to Single RGB LED Board 79, J100-1

RGB LED 80 [Light Mystery, Right]


J101-44		VIO-BLU	RGB100 BLU return from Single RGB LED Board 80, J100-4
J101-46		VIO-RED	RGB100 RED return from Single RGB LED Board 80, J100-3
J101-48		VIO-GRN	RGB100 GRN return from Single RGB LED Board 80, J100-2
J101-45		VIO	+4VDC to Single RGB LED Board 80, J100-1
J101-1		Not Used	
J101-5		Not Used	
J101-7		Not Used	
J101-11		Not Used	
J101-13		Not Used	
J101-17		Not Used	
J101-19		Not Used	
J101-23		Not Used	
J101-25		Not Used	
J101-29		Not Used	
J101-31		Not Used	
J101-35		Not Used	
J101-37		Not Used	
J101-41		Not Used	
J101-43		Not Used	
J101-47		Not Used	
J101-49		Not Used	
J101-50		Not Used	

J102 Middle RGB LED Control (RGB Cable 19-3095-08)


RGB LED 81 [LOCK Rollover]

J102-2		BLK-BLU	RGB100 BLU return from Single RGB LED Board 81, J100-4
J102-4		BLK-RED	RGB100 RED return from Single RGB LED Board 81, J100-3
J102-6		BLK-GRN	RGB100 GRN return from Single RGB LED Board 81, J100-2
J102-3		BLK	+4VDC to Single RGB LED Board 81, J100-1


RGB LED 82 [LOCK Rollover]

J102-8		BRN-BLU	RGB100 BLU return from Single RGB LED Board 82, J100-4
J102-10		BRN-RED	RGB100 RED return from Single RGB LED Board 82, J100-3
J102-12		BRN-GRN	RGB100 GRN return from Single RGB LED Board 82, J100-2
J102-9		BRN	+4VDC to Single RGB LED Board 82, J100-1


RGB LED 83 [Orc Pop-Up Parchment]

J102-14		RED-BLU	RGB100 BLU return from Double RGB LED Board 83/84, J100-5
J102-16		RED-GRY	RGB100 RED return from Double RGB LED Board 83/84, J100-6
J102-18		RED-GRN	RGB100 GRN return from Double RGB LED Board 83/84, J100-7
J102-15		RED	+4VDC to Double RGB LED Board 83/84, J100-8


RGB LED 84 [Orc Pop-Up Arrow]

J102-20		ORN-BLU	RGB101 BLU return from Double RGB LED Board 83/84, J100-1
J102-22		ORN-RED	RGB101 RED return from Double RGB LED Board 83/84, J100-2
J102-24		ORN-GRN	RGB101 GRN return from Double RGB LED Board 83/84, J100-3
J102-21		ORN	+4VDC to Double RGB LED Board 83/84, J100-4


RGB LED 85 [Thorin Parchment]

J102-26		YEL-GRN	RGB100 BLU return from Double RGB LED Board 85/86, J100-5
J102-28		YEL-RED	RGB100 RED return from Double RGB LED Board 85/86, J100-6
J102-30		YEL-BLU	RGB100 GRN return from Double RGB LED Board 85/86, J100-7
J102-27		YEL	+4VDC to Double RGB LED Board 85/86, J100-8


RGB LED 86 [Thorin Arrow]

J102-32		GRN-BLU	RGB101 BLU return from Double RGB LED Board 85/86, J100-1
J102-34		GRN-RED	RGB101 RED return from Double RGB LED Board 85/86, J100-2
J102-36		GRN-GRY	RGB101 GRN return from Double RGB LED Board 85/86, J100-3
J102-33		GRN	+4VDC to Double RGB LED Board 85/86, J100-4

RGB LED 87 [Goblin Pop-Up Parchment]

J102-38		BLU-GRY	RGB100 BLU return from Double RGB LED Board 87/88, J100-5
J102-40		BLU-RED	RGB100 RED return from Double RGB LED Board 87/88, J100-6
J102-42		BLU-GRN	RGB100 GRN return from Double RGB LED Board 87/88, J100-7
J102-39		BLU	+4VDC to Double RGB LED Board 87/88, J100-8

RGB LED 88 [Goblin Pop-Up Arrow]

J102-44		VIO-BLU	RGB101 BLU return from Double RGB LED Board 87/88, J100-1
J102-46		VIO-RED	RGB101 RED return from Double RGB LED Board 87/88, J100-2
J102-48		VIO-GRN	RGB101 GRN return from Double RGB LED Board 87/88, J100-3
J102-45		VIO	+4VDC to Double RGB LED Board 87/88, J100-4


J102-1		Not Used	
J102-5		Not Used	
J102-7		Not Used	
J102-11		Not Used	
J102-13		Not Used	
J102-17		Not Used	

J102 Middle RGB LED Control (RGB Cable 19-3095-08, cont.)


J102-19	Not Used
J102-23	Not Used
J102-25	Not Used
J102-29	Not Used
J102-31	Not Used
J102-35	Not Used
J102-37	Not Used
J102-41	Not Used
J102-43	Not Used
J102-47	Not Used
J102-49	Not Used
J102-50	Not Used

J103 Middle Right RGB LED Control (RGB Cable 19-3095-09)


RGB LED 89 [Ori]

J103-2		BLK-BLU	RGB100 BLU return from Triple RGB LED Board 89/90/91, J100-9
J103-4		BLK-RED	RGB100 RED return from Triple RGB LED Board 89/90/91, J100-10
J103-6		BLK-GRN	RGB100 GRN return from Triple RGB LED Board 89/90/91, J100-11
J103-3		BLK	+4VDC to Triple RGB LED Board 89/90/91, J100-12


RGB LED 90 [Dori]

J103-8		BRN-BLU	RGB101 BLU return from Triple RGB LED Board 89/90/91, J100-5
J103-10		BRN-RED	RGB101 RED return from Triple RGB LED Board 89/90/91, J100-6
J103-12		BRN-GRN	RGB101 GRN return from Triple RGB LED Board 89/90/91, J100-7
J103-9		BRN	+4VDC to Triple RGB LED Board 89/90/91, J100-8


RGB LED 91 [Nori]

J103-14		RED-BLU	RGB102 BLU return from Triple RGB LED Board 89/90/91, J100-1
J103-16		RED-GRY	RGB102 RED return from Triple RGB LED Board 89/90/91, J100-2
J103-18		RED-GRN	RGB102 GRN return from Triple RGB LED Board 89/90/91, J100-3
J103-15		RED	+4VDC to Triple RGB LED Board 89/90/91, J100-4


RGB LED 92 [Kili Arrow]

J103-20		ORN-BLU	RGB100 BLU return from Double RGB LED Board 92/93, J100-5
J103-22		ORN-RED	RGB100 RED return from Double RGB LED Board 92/93, J100-6
J103-24		ORN-GRN	RGB100 GRN return from Double RGB LED Board 92/93, J100-7
J103-21		ORN	+4VDC to Double RGB LED Board 92/93, J100-8


RGB LED 93 [Kili Parchment]

J103-26		YEL-BLU	RGB101 BLU return from Double RGB LED Board 92/93, J100-1
J103-28		YEL-RED	RGB101 RED return from Double RGB LED Board 92/93, J100-2
J103-30		YEL-GRN	RGB101 GRN return from Double RGB LED Board 92/93, J100-3
J103-27		YEL	+4VDC to Double RGB LED Board 92/93, J100-4


RGB LED 94 [EXTRA BALL]

J103-32		GRN-BLU	RGB100 BLU return from Triple RGB LED Board 94/95/96, J100-9
J103-34		GRN-RED	RGB100 RED return from Triple RGB LED Board 94/95/96, J100-10
J103-36		GRN-GRY	RGB100 GRN return from Triple RGB LED Board 94/95/96, J100-11
J103-33		GRN	+4VDC to Triple RGB LED Board 94/95/96, J100-12

RGB LED 95 [Radagast Parchment]

J103-38		BLU-GRY	RGB101 BLU return from Triple RGB LED Board 94/95/96, J100-5
J103-40		BLU-RED	RGB101 RED return from Triple RGB LED Board 94/95/96, J100-6
J103-42		BLU-GRN	RGB101 GRN return from Triple RGB LED Board 94/95/96, J100-7
J103-39		BLU	+4VDC to Triple RGB LED Board 94/95/96, J100-8

RGB LED 96 [Radagast Arrow]

J103-44		VIO-BLU	RGB102 BLU return from Triple RGB LED Board 94/95/96, J100-1
J103-46		VIO-RED	RGB102 RED return from Triple RGB LED Board 94/95/96, J100-2
J103-48		VIO-GRN	RGB102 GRN return from Triple RGB LED Board 94/95/96, J100-3
J103-45		VIO	+4VDC to Triple RGB LED Board 94/95/96, J100-4

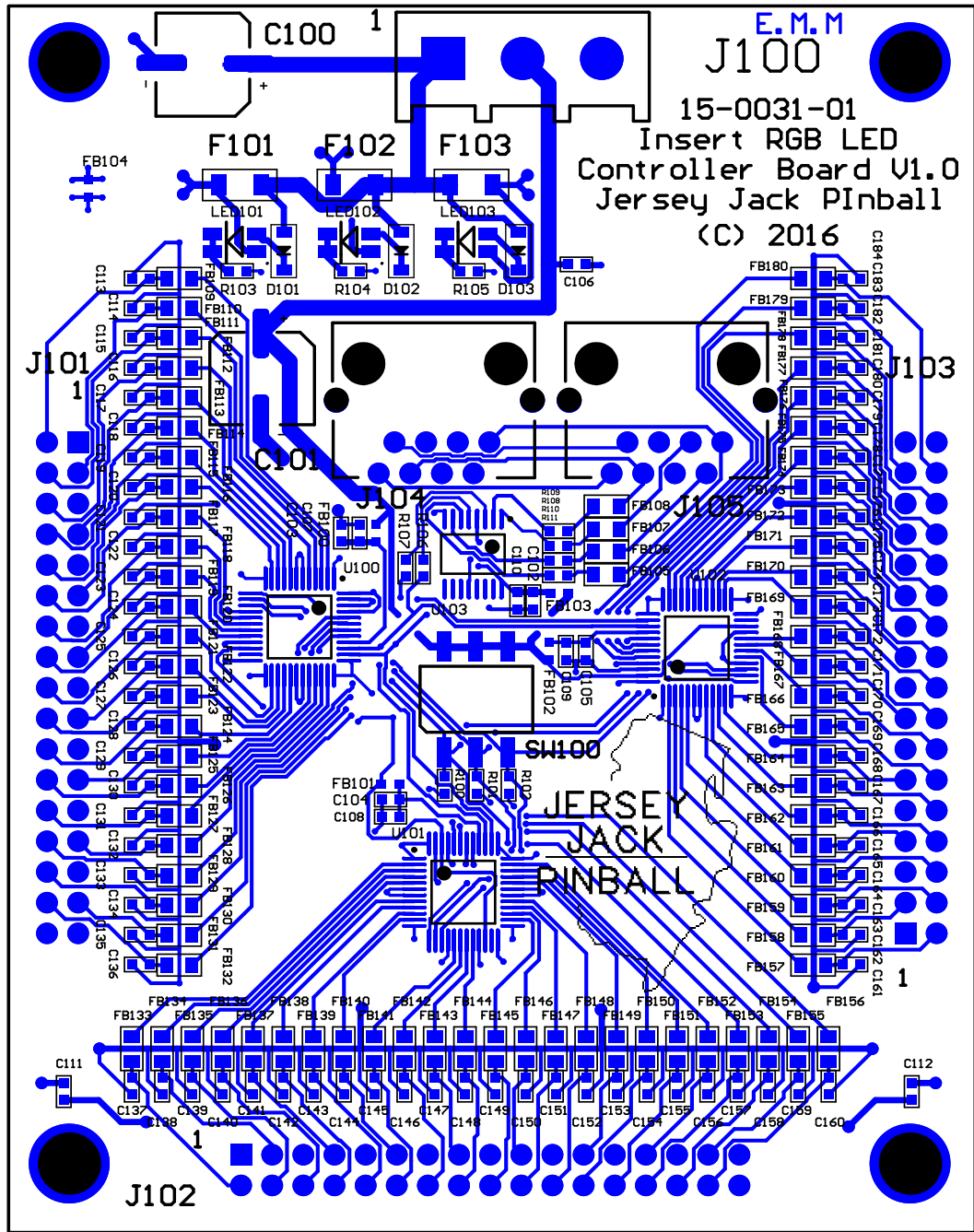
J103-1		Not Used
J103-5		Not Used
J103-7		Not Used
J103-11		Not Used
J103-13		Not Used
J103-17		Not Used
J103-19		Not Used
J103-23		Not Used
J103-25		Not Used
J103-29		Not Used
J103-31		Not Used
J103-35		Not Used
J103-37		Not Used
J103-41		Not Used
J103-43		Not Used
J103-47		Not Used
J103-49		Not Used
J103-50		Not Used

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from RGB LED Controller Bd B, J105

J105 UFM I2C Communications

CAT5 or higher Ethernet cable to RGB LED Controller Bd A, J104



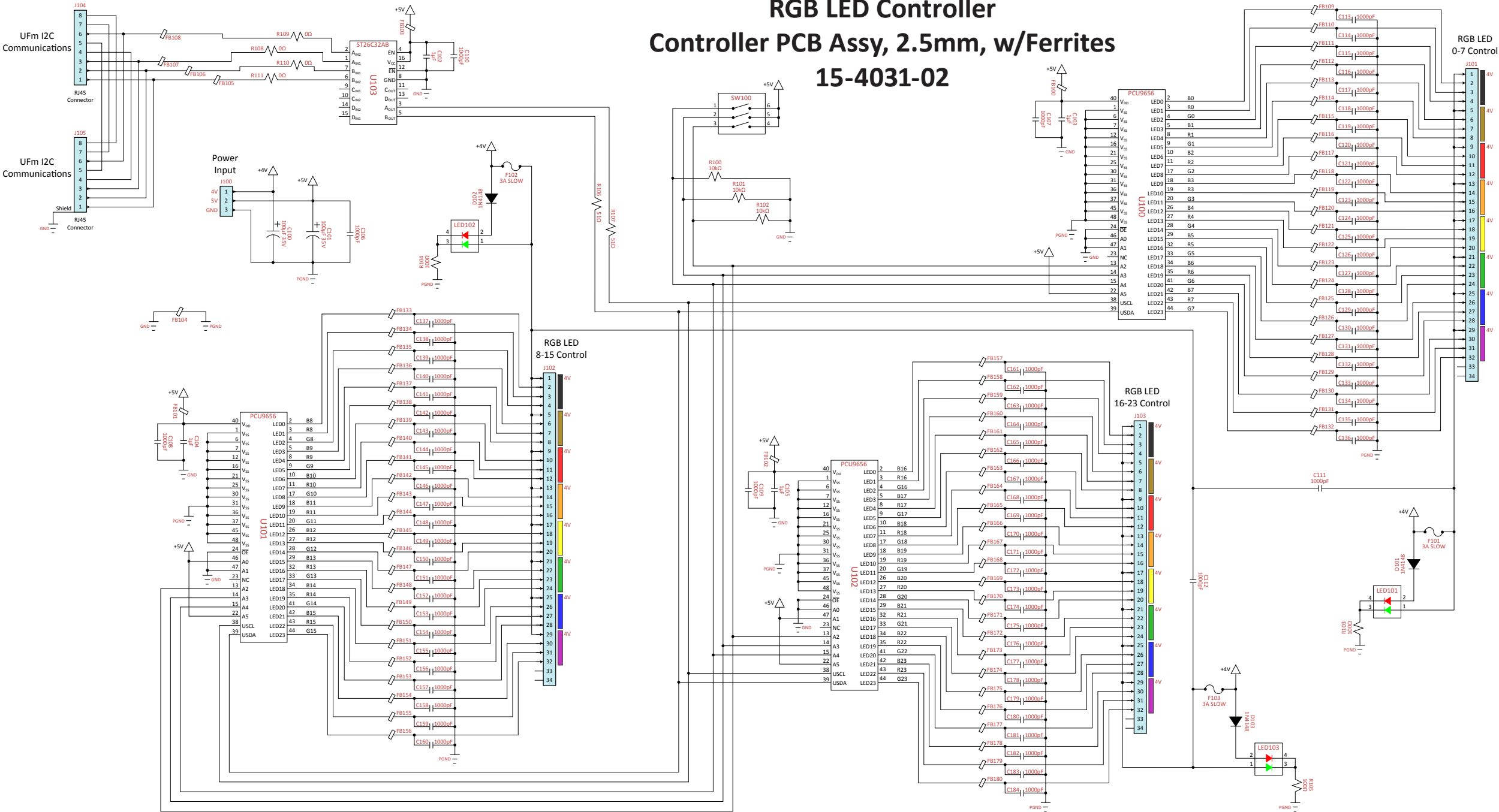
RGB LED Controller PCB Assy, 2.5mm, w/Ferrites
15-4031-02
(games manufactured on/after Aug 11, 2016)

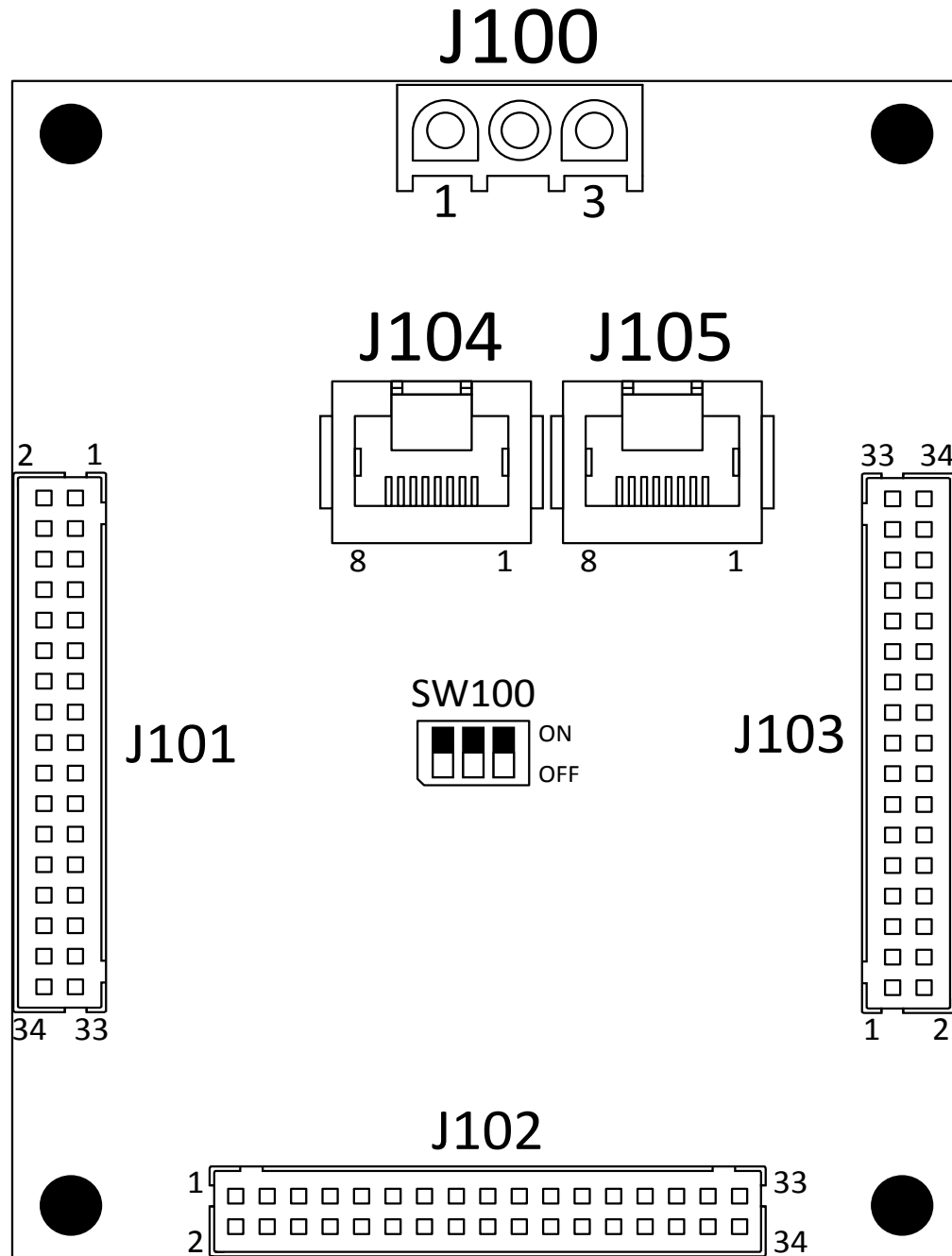
Component(s)	Part Number	Description
BARE PCB	15-0031-01	RGB LED Controller Board, 2.5mm
C100, C101	109-100M-035	Capacitor, Elect (Radial), 100μF, 35V, 20%
C102-C105	103-105Z-016	Capacitor, MLCC, 0603 SMT, 1μF, 16V, +80%, -20%
C106-C184	103-102K-050	Capacitor, MLCC, 0603 SMT, 1000pF, 50V, 10%
D101-D103	110-1001-0S	Diode, 1N4148, SMT, 100V, 300mA
F101-F103	170-6303-SS	Fuse, Slow, 1206 SMT, 3A, 63V
FB100-FB104	195-5002-0S	EMI Filter Bead, 0603 SMT, 2.2kΩ at 100MHz, 150mA
FB105-FB180	195-5003-0S	EMI Filter Bead, 0805 SMT, 2.5kΩ at 100MHz, 200mA
LED101-LED103	24-0020-0S	LED, 1210 SMD, RED/GRN, 569/621nm
R100-R102	122-10K0-104	Resistor, 0603 SMT, 10kΩ, 0.1W, 5%
R103-R105	122-0100-104	Resistor, 0603 SMT, 100Ω, 0.1W, 5%
R106, R107	122-51P1-102	Resistor, 0603 SMT, 51.1Ω, 0.1W, 1%
R108-R111	122-0000-100	Resistor, 0603 SMT, 0Ω
SW100	18-8003-0S	Switch, DIP, 3-pos, 2.54mm
U100-U102	140-0005-0S	LED Driver, I2C-Bus, 24-Bit, 5MHz, PCU9656, LQFP-48 SMT
U103	141-0020-0S	Quad Diff Line Rcvr w/3-State Outputs, ST26C32AB, TSSOP-16 SMT
J100	30-2005-03	Header, Male, 3-pin, 6.35mm
J101-J103	30-2203-34	Header, Male, 34-Pin, 2 Rows, 2.5mm
J104, J105	30-2510-01	Jack Header, w/Shield, RJ45 (Ethernet)

RGB LED Controller

Controller PCB Assy, 2.5mm, w/Ferrites

15-4031-02





RGB LED Controller Board A 15-4031-02 (2.5mm, w/Ferrites) Connector Pin-outs

J100 Power Input

J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply
J100-2	RED	+5VDC from Primary ATX Pwr Supply
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply

J101 Upper Right RGB LED Control (RGB Cable 19-3095-11)

RGB LED 25 [Bilbo Arrow]

J101-1	BLK	+4VDC to Double RGB LED Board 25/26, J100-1
J101-2	BLK-BLU	RGB100 BLU return from Double RGB LED Board 25/26, J100-4
J101-3	BLK-RED	RGB100 RED return from Double RGB LED Board 25/26, J100-3
J101-4	BLK-GRN	RGB100 GRN return from Double RGB LED Board 25/26, J100-2

RGB LED 26 [Bilbo Parchment]

J101-6	BRN-BLU	RGB101 BLU return from Double RGB LED Board 25/26, J100-8
J101-7	BRN-RED	RGB101 RED return from Double RGB LED Board 25/26, J100-7
J101-8	BRN-GRN	RGB101 GRN return from Double RGB LED Board 25/26, J100-6

RGB LED 27 [Mystery]

J101-9	RED	+4VDC to Double RGB LED Board 27/28, J100-1
J101-10	RED-BLU	RGB100 BLU return from Double RGB LED Board 27/28, J100-4
J101-11	RED-GRY	RGB100 RED return from Double RGB LED Board 27/28, J100-3
J101-12	RED-GRN	RGB100 GRN return from Double RGB LED Board 27/28, J100-2


RGB LED 28 [Bag End]

J101-14	ORN-BLU	RGB101 BLU return from Double RGB LED Board 27/28, J100-8
J101-15	ORN-RED	RGB101 RED return from Double RGB LED Board 27/28, J100-7
J101-16	ORN-GRN	RGB101 GRN return from Double RGB LED Board 27/28, J100-6

RGB LED 29 [Pop Bumpers, Lower]

J101-17	YEL	+4VDC to Single RGB LED Board 29, J100-1
J101-18	YEL-BLU	RGB100 BLU return from Single RGB LED Board 29, J100-4
J101-19	YEL-RED	RGB100 RED return from Single RGB LED Board 29, J100-3
J101-20	YEL-GRN	RGB100 GRN return from Single RGB LED Board 29, J100-2


J101 Upper Right RGB LED Control (RGB Cable 19-3095-11, cont.)**RGB LED 30 [Pop Bumpers, Right]**

J101-21		GRN	+4VDC to Single RGB LED Board 30, J100-1
J101-22		GRN-BLU	RGB100 BLU return from Single RGB LED Board 30, J100-4
J101-23		GRN-RED	RGB100 RED return from Single RGB LED Board 30, J100-3
J101-24		GRN-GRY	RGB100 GRN return from Single RGB LED Board 30, J100-2


RGB LED 31 [Pop Bumpers, Left]

J101-25		BLU	+4VDC to Single RGB LED Board 31, J100-1
J101-26		BLU-GRY	RGB100 BLU return from Single RGB LED Board 31, J100-4
J101-27		BLU-RED	RGB100 RED return from Single RGB LED Board 31, J100-3
J101-28		BLU-GRN	RGB100 GRN return from Single RGB LED Board 31, J100-2
J101-29		Not Used	
J101-30		Not Used	
J101-31		Not Used	
J101-32		Not Used	
J101-33		Not Used	
J101-34		Not Used	
J101-5		Not Used	
J101-13		Not Used	


J102 Upper Left RGB LED Control (RGB Cable 19-3095-12)**RGB LED 33 [Balin, Left]**

J102-1		BLK	+4VDC to Double RGB LED Board 33/34, J100-1
J102-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 33/34, J100-4
J102-3		BLK-RED	RGB100 RED return from Double RGB LED Board 33/34, J100-3
J102-4		BLK-GRN	RGB100 GRN return from Double RGB LED Board 33/34, J100-2


RGB LED 34 [Balin, Right]

J102-6		BRN-BLU	RGB101 BLU return from Double RGB LED Board 33/34, J100-8
J102-7		BRN-RED	RGB101 RED return from Double RGB LED Board 33/34, J100-7
J102-8		BRN-GRN	RGB101 GRN return from Double RGB LED Board 33/34, J100-6


RGB LED 35 [Bombur]

J102-9		RED	+4VDC to Triple RGB LED Board 35/36/37, J100-1
J102-10		RED-BLU	RGB100 BLU return from Triple RGB LED Board 35/36/37, J100-4
J102-11		RED-GRY	RGB100 RED return from Triple RGB LED Board 35/36/37, J100-3
J102-12		RED-GRN	RGB100 GRN return from Triple RGB LED Board 35/36/37, J100-2


RGB LED 36 [Bofur]

J102-14		ORN-BLU	RGB101 BLU return from Triple RGB LED Board 35/36/37, J100-7
J102-15		ORN-RED	RGB101 RED return from Triple RGB LED Board 35/36/37, J100-6
J102-16		ORN-GRN	RGB101 GRN return from Triple RGB LED Board 35/36/37, J100-5


RGB LED 37 [Bifur]

J102-18		YEL-GRN	RGB102 BLU return from Triple RGB LED Board 35/36/37, J100-10
J102-19		YEL-RED	RGB102 RED return from Triple RGB LED Board 35/36/37, J100-9
J102-20		YEL-BLU	RGB102 GRN return from Triple RGB LED Board 35/36/37, J100-8


RGB LED 38 [Smaug Pillar]

J102-21		GRN	+4VDC to Single RGB LED Board 38, J100-1
J102-22		GRN-BLU	RGB100 BLU return from Single RGB LED Board 38, J100-4
J102-23		GRN-RED	RGB100 RED return from Single RGB LED Board 38, J100-3
J102-24		GRN-GRY	RGB100 GRN return from Single RGB LED Board 38, J100-2

RGB LED 39 [Smaug Gold Pile]


J102-25		BLU	+4VDC to Single RGB LED Board 39, J100-1
J102-26		BLU-GRY	RGB100 BLU return from Single RGB LED Board 39, J100-4
J102-27		BLU-RED	RGB100 RED return from Single RGB LED Board 39, J100-3
J102-28		BLU-GRN	RGB100 GRN return from Single RGB LED Board 39, J100-2

RGB LED 40 [Smaug Mouth]


J102-29		VIO	+4VDC to Single RGB LED Board 40, J100-1
J102-30		VIO-BLU	RGB100 BLU return from Single RGB LED Board 40, J100-4
J102-31		VIO-RED	RGB100 RED return from Single RGB LED Board 40, J100-3
J102-32		VIO-GRN	RGB100 GRN return from Single RGB LED Board 40, J100-2
J102-33		Not Used	
J102-34		Not Used	
J102-5		Not Used	
J102-13		Not Used	
J102-17		Not Used	

J103 Upper Middle RGB LED Control (RGB Cable 19-3095-13)


RGB LED 41 [Gandalf Parchment]

J103-1		BLK	+4VDC to Double RGB LED Board 41/42, J100-1
J103-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 41/42, J100-4
J103-3		BLK-RED	RGB100 RED return from Double RGB LED Board 41/42, J100-3
J103-4		BLK-GRN	RGB100 GRN return from Double RGB LED Board 41/42, J100-2


RGB LED 42 [Gandalf Arrow]

J103-6		BRN-BLU	RGB101 BLU return from Double RGB LED Board 41/42, J100-8
J103-7		BRN-RED	RGB101 RED return from Double RGB LED Board 41/42, J100-7
J103-8		BRN-GRN	RGB101 GRN return from Double RGB LED Board 41/42, J100-6


RGB LED 43 [Bilbo Ramp *MODE* Cut-out]

J103-9		RED	+4VDC to Double RGB LED Board 43/44, J100-1
J103-10		RED-BLU	RGB100 BLU return from Double RGB LED Board 43/44, J100-4
J103-11		RED-GRY	RGB100 RED return from Double RGB LED Board 43/44, J100-3
J103-12		RED-GRN	RGB100 GRN return from Double RGB LED Board 43/44, J100-2


RGB LED 44 [Bilbo Ramp *LOCK* Cut-out]

J103-14		ORN-BLU	RGB101 BLU return from Double RGB LED Board 43/44, J100-8
J103-15		ORN-RED	RGB101 RED return from Double RGB LED Board 43/44, J100-7
J103-16		ORN-GRN	RGB101 GRN return from Double RGB LED Board 43/44, J100-6


RGB LED 45 [Key]

J103-17		YEL	+4VDC to Single RGB LED Board 45, J100-1
J103-18		YEL-BLU	RGB100 BLU return from Single RGB LED Board 45, J100-4
J103-19		YEL-RED	RGB100 RED return from Single RGB LED Board 45, J100-3
J103-20		YEL-GRN	RGB100 GRN return from Single RGB LED Board 45, J100-2


RGB LED 46 [Gandalf Ramp *BOOK* Cut-out]

J103-21		GRN	+4VDC to Double RGB LED Board 46/47, J100-1
J103-22		GRN-BLU	RGB100 BLU return from Double RGB LED Board 46/47, J100-4
J103-23		GRN-RED	RGB100 RED return from Double RGB LED Board 46/47, J100-3
J103-24		GRN-GRY	RGB100 GRN return from Double RGB LED Board 46/47, J100-2

RGB LED 47 [Gandalf Ramp *TIME* Cut-out]

J103-26		BLU-GRY	RGB101 BLU return from Double RGB LED Board 46/47, J100-8
J103-27		BLU-RED	RGB101 RED return from Double RGB LED Board 46/47, J100-7
J103-28		BLU-GRN	RGB101 GRN return from Double RGB LED Board 46/47, J100-6

RGB LED 48 [Ring Button Light]

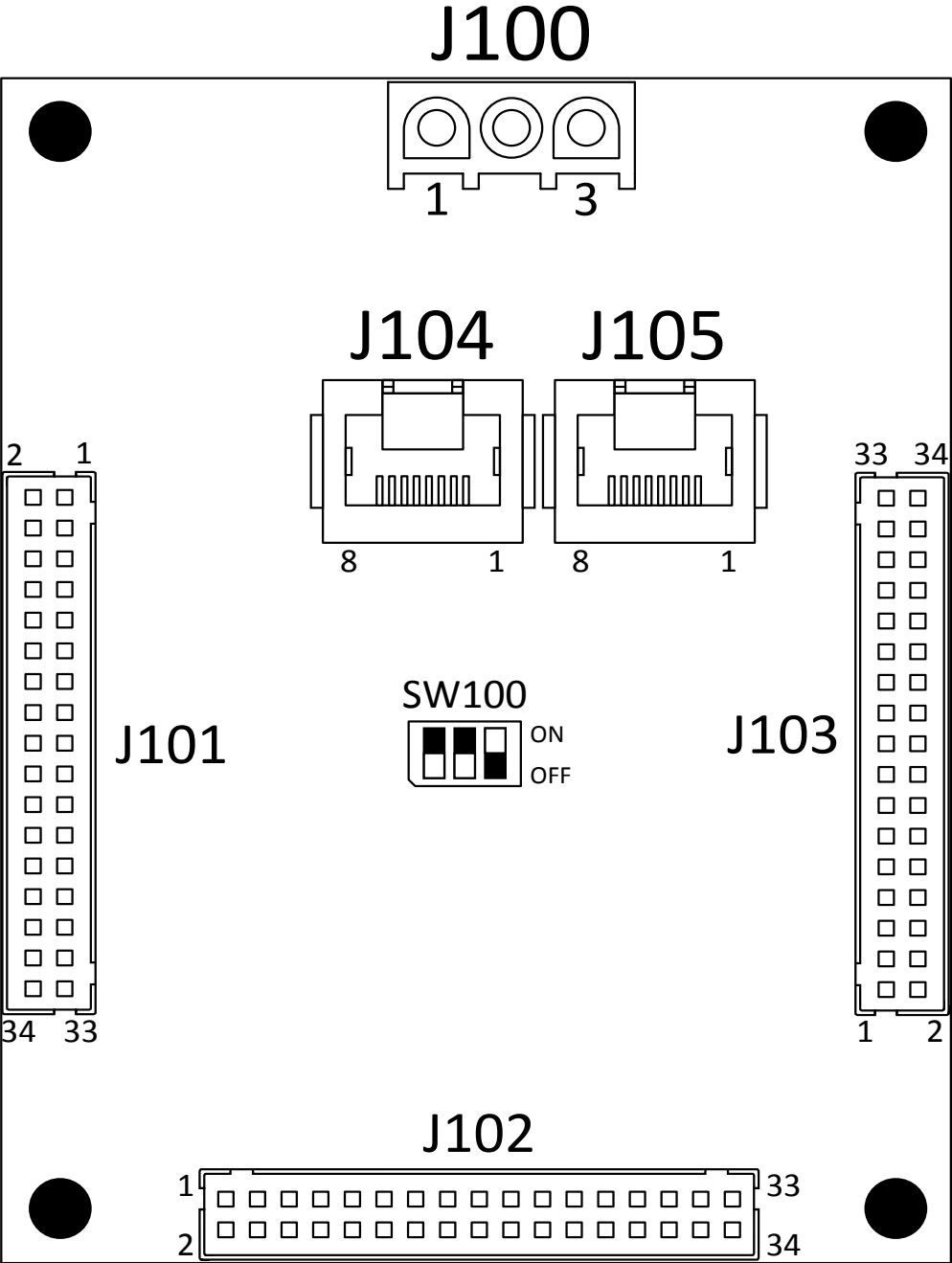
J103-29		VIO	+4VDC to Single RGB LED Board 48, J100-1, thru 6-pin inline connector
J103-30		VIO-BLU	RGB100 BLU return from Single RGB LED Board 48, J100-4, thru 6-pin inline connector
J103-31		VIO-RED	RGB100 RED return from Single RGB LED Board 48, J100-3, thru 6-pin inline connector
J103-32		VIO-GRN	RGB100 GRN return from Single RGB LED Board 48, J100-2, thru 6-pin inline connector
J103-33		Not Used	
J103-34		Not Used	
J103-5		Not Used	
J103-13		Not Used	
J103-25		Not Used	

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from RGB LED Controller Bd C, J105

J105 UFM I2C Communications

Not Used






RGB LED Controller Board B
15-4031-02 (2.5mm, w/Ferrites)
Connector Pin-outs





J100 Power Input		
J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply
J100-2	RED	+5VDC from Primary ATX Pwr Supply (jumped from RGB LED Controller Bd A, J100-2)
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply
J101 Middle Left RGB LED Control (RGB Cable 19-3095-14)		
<i>RGB LED 49 [Gloin]</i>		
J101-1	BLK	+4VDC to Triple RGB LED Board 49/50/51, J100-1
J101-2	BLK-BLU	RGB100 BLU return from Triple RGB LED Board 49/50/51, J100-4
J101-3	BLK-RED	RGB100 RED return from Triple RGB LED Board 49/50/51, J100-3
J101-4	BLK-GRN	RGB100 GRN return from Triple RGB LED Board 49/50/51, J100-2
<i>RGB LED 50 [Oin]</i>		
J101-6	BRN-BLU	RGB101 BLU return from Triple RGB LED Board 49/50/51, J100-7
J101-7	BRN-RED	RGB101 RED return from Triple RGB LED Board 49/50/51, J100-6
J101-8	BRN-GRN	RGB101 GRN return from Triple RGB LED Board 49/50/51, J100-5
<i>RGB LED 51 [Dwalin]</i>		
J101-10	RED-BLU	RGB102 BLU return from Triple RGB LED Board 49/50/51, J100-10
J101-11	RED-GRY	RGB102 RED return from Triple RGB LED Board 49/50/51, J100-9
J101-12	RED-GRN	RGB102 GRN return from Triple RGB LED Board 49/50/51, J100-8
<i>RGB LED 52 [EXTRA BALL]</i>		
J101-13	ORN	+4VDC to Triple RGB LED Board 52/53/54, J100-1
J101-14	ORN-BLU	RGB100 BLU return from Triple RGB LED Board 52/53/54, J100-4
J101-15	ORN-RED	RGB100 RED return from Triple RGB LED Board 52/53/54, J100-3
J101-16	ORN-GRN	RGB100 GRN return from Triple RGB LED Board 52/53/54, J100-2
<i>RGB LED 53 [Balin Parchment]</i>		
J101-18	YEL-BLU	RGB101 BLU return from Triple RGB LED Board 52/53/54, J100-7
J101-19	YEL-RED	RGB101 RED return from Triple RGB LED Board 52/53/54, J100-6
J101-20	YEL-GRN	RGB101 GRN return from Triple RGB LED Board 52/53/54, J100-5

J101 Middle Left RGB LED Control (RGB Cable 19-3095-14, cont.)




RGB LED 54 [Balin Arrow]

J101-22		GRN-BLU	RGB102 BLU return from Triple RGB LED Board 52/53/54, J100-10
J101-23		GRN-RED	RGB102 RED return from Triple RGB LED Board 52/53/54, J100-9
J101-24		GRN-GRY	RGB102 GRN return from Triple RGB LED Board 52/53/54, J100-8

RGB LED 55 [Fili Parchment]





J101-25		BLU	+4VDC to Double RGB LED Board 55/56, J100-1
J101-26		BLU-GRY	RGB100 BLU return from Double RGB LED Board 55/56, J100-4
J101-27		BLU-RED	RGB100 RED return from Double RGB LED Board 55/56, J100-3
J101-28		BLU-GRN	RGB100 GRN return from Double RGB LED Board 55/56, J100-2

RGB LED 56 [Fili Arrow]





J101-30		VIO-BLU	RGB101 BLU return from Double RGB LED Board 55/56, J100-8
J101-31		VIO-RED	RGB101 RED return from Double RGB LED Board 55/56, J100-7
J101-32		VIO-GRN	RGB101 GRN return from Double RGB LED Board 55/56, J100-6
J101-33		Not Used	
J101-34		Not Used	
J101-5		Not Used	
J101-9		Not Used	
J101-17		Not Used	
J101-21		Not Used	
J101-29		Not Used	

J102 Lower Middle RGB LED Control (RGB Cable 19-3095-15)





RGB LED 57 [Shoot Again]

J102-1		BLK	+4VDC to Arkenstone RGB LED Board, J100-1
J102-2		BLK-BLU	RGB100 BLU return from Arkenstone RGB LED Board, J100-4
J102-3		BLK-RED	RGB100 RED return from Arkenstone RGB LED Board, J100-3
J102-4		BLK-GRN	RGB100 GRN return from Arkenstone RGB LED Board, J100-2




RGB LED 58 [Lock 1]

J102-5		BRN	+4VDC to Arkenstone RGB LED Board, J100-5
J102-6		BRN-BLU	RGB101 BLU return from Arkenstone RGB LED Board, J100-8
J102-7		BRN-RED	RGB101 RED return from Arkenstone RGB LED Board, J100-7
J102-8		BRN-GRN	RGB101 GRN return from Arkenstone RGB LED Board, J100-6




RGB LED 59 [Lock 2]

J102-9		RED	+4VDC to Arkenstone RGB LED Board, J100-9
J102-10		RED-BLU	RGB102 BLU return from Arkenstone RGB LED Board, J100-12
J102-11		RED-GRY	RGB102 RED return from Arkenstone RGB LED Board, J100-11
J102-12		RED-GRN	RGB102 GRN return from Arkenstone RGB LED Board, J100-10




RGB LED 60 [Barrel Escape]

J102-14		ORN-BLU	RGB103 BLU return from Arkenstone RGB LED Board, J100-16
J102-15		ORN-RED	RGB103 RED return from Arkenstone RGB LED Board, J100-15
J102-16		ORN-GRN	RGB103 GRN return from Arkenstone RGB LED Board, J100-14




RGB LED 61 [Into The Fire]

J102-18		YEL-GRN	RGB104 BLU return from Arkenstone RGB LED Board, J100-20
J102-19		YEL-RED	RGB104 RED return from Arkenstone RGB LED Board, J100-19
J102-20		YEL-BLU	RGB104 GRN return from Arkenstone RGB LED Board, J100-18




RGB LED 62 [Super X]

J102-22		GRN-BLU	RGB105 BLU return from Arkenstone RGB LED Board, J100-24
J102-23		GRN-RED	RGB105 RED return from Arkenstone RGB LED Board, J100-23
J102-24		GRN-GRY	RGB105 GRN return from Arkenstone RGB LED Board, J100-22

RGB LED 63 [Battle Of Five Armies]


J102-26		BLU-GRY	RGB106 BLU return from Arkenstone RGB LED Board, J100-28
J102-27		BLU-RED	RGB106 RED return from Arkenstone RGB LED Board, J100-27
J102-28		BLU-GRN	RGB106 GRN return from Arkenstone RGB LED Board, J100-26

RGB LED 64 [Arkenstone]


J102-30		VIO-BLU	RGB107 BLU return from Arkenstone RGB LED Board, J100-32
J102-31		VIO-RED	RGB107 RED return from Arkenstone RGB LED Board, J100-31
J102-32		VIO-GRN	RGB107 GRN return from Arkenstone RGB LED Board, J100-30
J102-33		Not Used	
J102-34		Not Used	
J102-13		Not Used	
J102-17		Not Used	
J102-21		Not Used	
J102-29		Not Used	

J103 Lower Left RGB LED Control (RGB Cable 19-3095-16)


RGB LED 65 [Spider Pop-Up Parchment]

J103-1		BLK	+4VDC to Double RGB LED Board 65/66, J100-1
J103-2		BLK-BLU	RGB100 BLU return from Double RGB LED Board 65/66, J100-4
J103-3		BLK-RED	RGB100 RED return from Double RGB LED Board 65/66, J100-3
J103-4		BLK-GRN	RGB100 GRN return from Double RGB LED Board 65/66, J100-2


RGB LED 66 [Spider Pop-Up Arrow]

J103-6		BRN-BLU	RGB101 BLU return from Double RGB LED Board 65/66, J100-8
J103-7		BRN-RED	RGB101 RED return from Double RGB LED Board 65/66, J100-7
J103-8		BRN-GRN	RGB101 GRN return from Double RGB LED Board 65/66, J100-6


RGB LED 67 [Kickback]

J103-9		RED	+4VDC to Double RGB LED Board 67/68, J100-1
J103-10		RED-BLU	RGB100 BLU return from Double RGB LED Board 67/68, J100-4
J103-11		RED-GRY	RGB100 RED return from Double RGB LED Board 67/68, J100-3
J103-12		RED-GRN	RGB100 GRN return from Double RGB LED Board 67/68, J100-2


RGB LED 68 [Load Arrow]

J103-14		ORN-BLU	RGB101 BLU return from Double RGB LED Board 67/68, J100-8
J103-15		ORN-RED	RGB101 RED return from Double RGB LED Board 67/68, J100-7
J103-16		ORN-GRN	RGB101 GRN return from Double RGB LED Board 67/68, J100-6


RGB LED 69 [Return Lane Orc]

J103-17		YEL	+4VDC to Double RGB LED Board 69/70, J100-1
J103-18		YEL-BLU	RGB100 BLU return from Double RGB LED Board 69/70, J100-4
J103-19		YEL-RED	RGB100 RED return from Double RGB LED Board 69/70, J100-3
J103-20		YEL-GRN	RGB100 GRN return from Double RGB LED Board 69/70, J100-2

RGB LED 70 [Return Lane Warg]

J103-22		GRN-BLU	RGB101 BLU return from Double RGB LED Board 69/70, J100-8
J103-23		GRN-RED	RGB101 RED return from Double RGB LED Board 69/70, J100-7
J103-24		GRN-GRY	RGB101 GRN return from Double RGB LED Board 69/70, J100-6

RGB LED 71 [Light Mystery, Left]

J103-25		BLU	+4VDC to Single RGB LED Board 71, J100-1
J103-26		BLU-GRY	RGB100 BLU return from Single RGB LED Board 71, J100-4
J103-27		BLU-RED	RGB100 RED return from Single RGB LED Board 71, J100-3
J103-28		BLU-GRN	RGB100 GRN return from Single RGB LED Board 71, J100-2
J103-29		Not Used	
J103-30		Not Used	
J103-31		Not Used	

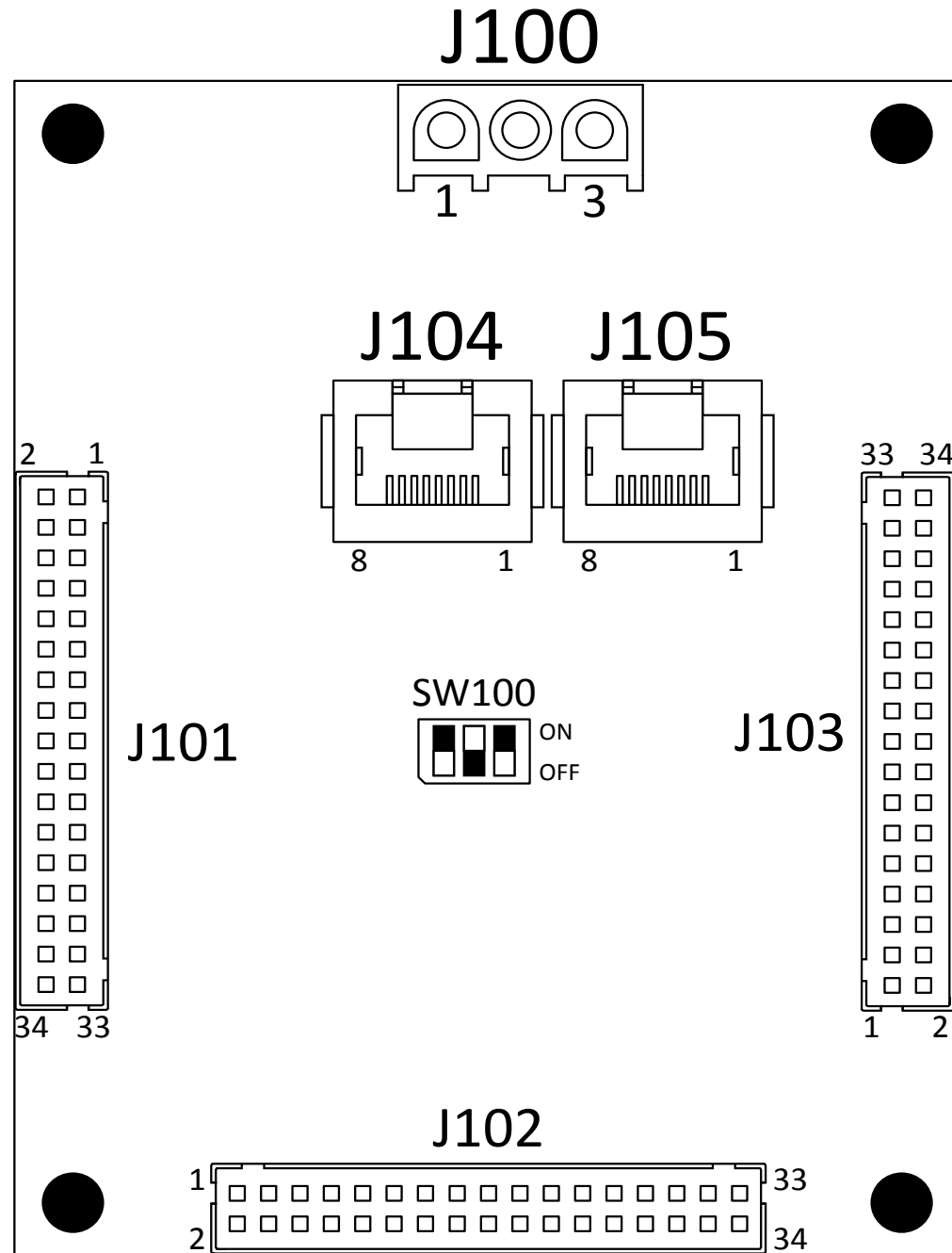
J103-32	Not Used
J103-33	Not Used
J103-34	Not Used
J103-5	Not Used
J103-13	Not Used
J103-21	Not Used

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from BAG Controller Bd, J103

J105 UFM I2C Communications

CAT5 or higher Ethernet cable to RGB LED Controller Bd C, J104



RGB LED Controller Board C 15-4031-02 (2.5mm, w/Ferrites) Connector Pin-outs

J100 Power Input

J100-1	WHT	+4VDC from 7.5/4VDC Pwr Supply (jumped from RGB LED Controller Bd B, J100-1)
J100-2	RED	+5VDC from Primary ATX Pwr Supply (jumped from BAG Controller Bd, J100-3)
J100-3	BLK	Ground from 7.5/4VDC Pwr Supply (jumped from RGB LED Controller Bd B, J100-3)

J101 Lower Right RGB LED Control (RGB Cable 19-3095-17)

RGB LED 73 [Warg Pop-Up Parchment]

J101-1	BLK	+4VDC to Double RGB LED Board 73/74, J100-1
J101-2	BLK-BLU	RGB100 BLU return from Double RGB LED Board 73/74, J100-4
J101-3	BLK-RED	RGB100 RED return from Double RGB LED Board 73/74, J100-3
J101-4	BLK-GRN	RGB100 GRN return from Double RGB LED Board 73/74, J100-2

RGB LED 74 [Warg Pop-Up Arrow]

J101-6	BRN-BLU	RGB101 BLU return from Double RGB LED Board 73/74, J100-8
J101-7	BRN-RED	RGB101 RED return from Double RGB LED Board 73/74, J100-7
J101-8	BRN-GRN	RGB101 GRN return from Double RGB LED Board 73/74, J100-6

RGB LED 75 [LOCK Rollover]

J101-9	RED	+4VDC to Single RGB LED Board 75, J100-1
J101-10	RED-BLU	RGB100 BLU return from Single RGB LED Board 75, J100-4
J101-11	RED-GRY	RGB100 RED return from Single RGB LED Board 75, J100-3
J101-12	RED-GRN	RGB100 GRN return from Single RGB LED Board 75, J100-2




RGB LED 76 [LOCK Rollover]

J101-13	ORN	+4VDC to Single RGB LED Board 76, J100-1
J101-14	ORN-BLU	RGB100 BLU return from Single RGB LED Board 76, J100-4
J101-15	ORN-RED	RGB100 RED return from Single RGB LED Board 76, J100-3
J101-16	ORN-GRN	RGB100 GRN return from Single RGB LED Board 76, J100-2





RGB LED 77 [Return Lane Spider]

J101-17	YEL	+4VDC to Double RGB LED Board 77/78, J100-1
J101-18	YEL-BLU	RGB100 BLU return from Double RGB LED Board 77/78, J100-4
J101-19	YEL-RED	RGB100 RED return from Double RGB LED Board 77/78, J100-3
J101-20	YEL-GRN	RGB100 GRN return from Double RGB LED Board 77/78, J100-2





J101 Lower Right RGB LED Control (RGB Cable 19-3095-17, cont.)*RGB LED 78 [Return Lane Goblin]*

J101-22		GRN-BLU	RGB101 BLU return from Double RGB LED Board 77/78, J100-8
J101-23		GRN-RED	RGB101 RED return from Double RGB LED Board 77/78, J100-7
J101-24		GRN-GRY	RGB101 GRN return from Double RGB LED Board 77/78, J100-6





RGB LED 79 [Preciousssss]

J101-25		BLU	+4VDC to Single RGB LED Board 79, J100-1
J101-26		BLU-GRY	RGB100 BLU return from Single RGB LED Board 79, J100-4
J101-27		BLU-RED	RGB100 RED return from Single RGB LED Board 79, J100-3
J101-28		BLU-GRN	RGB100 GRN return from Single RGB LED Board 79, J100-2





RGB LED 80 [Light Mystery, Right]

J101-29		VIO	+4VDC to Single RGB LED Board 80, J100-1
J101-30		VIO-BLU	RGB100 BLU return from Single RGB LED Board 80, J100-4
J101-31		VIO-RED	RGB100 RED return from Single RGB LED Board 80, J100-3
J101-32		VIO-GRN	RGB100 GRN return from Single RGB LED Board 80, J100-2
J101-33		Not Used	
J101-34		Not Used	
J101-5		Not Used	
J101-21		Not Used	





J102 Middle RGB LED Control (RGB Cable 19-3095-18)*RGB LED 81 [LOCK Rollover]*

J102-1		BLK	+4VDC to Single RGB LED Board 81, J100-1
J102-2		BLK-BLU	RGB100 BLU return from Single RGB LED Board 81, J100-4
J102-3		BLK-RED	RGB100 RED return from Single RGB LED Board 81, J100-3
J102-4		BLK-GRN	RGB100 GRN return from Single RGB LED Board 81, J100-2




RGB LED 82 [LOCK Rollover]

J102-5		BRN	+4VDC to Single RGB LED Board 82, J100-1
J102-6		BRN-BLU	RGB100 BLU return from Single RGB LED Board 82, J100-4
J102-7		BRN-RED	RGB100 RED return from Single RGB LED Board 82, J100-3
J102-8		BRN-GRN	RGB100 GRN return from Single RGB LED Board 82, J100-2





RGB LED 83 [Orc Pop-Up Parchment]

J102-9		RED	+4VDC to Double RGB LED Board 83/84, J100-1
J102-10		RED-BLU	RGB100 BLU return from Double RGB LED Board 83/84, J100-4
J102-11		RED-GRY	RGB100 RED return from Double RGB LED Board 83/84, J100-3
J102-12		RED-GRN	RGB100 GRN return from Double RGB LED Board 83/84, J100-2




RGB LED 84 [Orc Pop-Up Arrow]

J102-14		ORN-BLU	RGB101 BLU return from Double RGB LED Board 83/84, J100-8
J102-15		ORN-RED	RGB101 RED return from Double RGB LED Board 83/84, J100-7
J102-16		ORN-GRN	RGB101 GRN return from Double RGB LED Board 83/84, J100-6





RGB LED 85 [Thorin Parchment]

J102-17		YEL	+4VDC to Double RGB LED Board 85/86, J100-1
J102-18		YEL-GRN	RGB100 BLU return from Double RGB LED Board 85/86, J100-4
J102-19		YEL-RED	RGB100 RED return from Double RGB LED Board 85/86, J100-3
J102-20		YEL-BLU	RGB100 GRN return from Double RGB LED Board 85/86, J100-2




RGB LED 86 [Thorin Arrow]

J102-22		GRN-BLU	RGB101 BLU return from Double RGB LED Board 85/86, J100-8
J102-23		GRN-RED	RGB101 RED return from Double RGB LED Board 85/86, J100-7
J102-24		GRN-GRY	RGB101 GRN return from Double RGB LED Board 85/86, J100-6

RGB LED 87 [Goblin Pop-Up Parchment]


J102-25		BLU	+4VDC to Double RGB LED Board 87/88, J100-1
J102-26		BLU-GRY	RGB100 BLU return from Double RGB LED Board 87/88, J100-4
J102-27		BLU-RED	RGB100 RED return from Double RGB LED Board 87/88, J100-3
J102-28		BLU-GRN	RGB100 GRN return from Double RGB LED Board 87/88, J100-2

RGB LED 88 [Goblin Pop-Up Arrow]


J102-30		VIO-BLU	RGB101 BLU return from Double RGB LED Board 87/88, J100-8
J102-31		VIO-RED	RGB101 RED return from Double RGB LED Board 87/88, J100-7
J102-32		VIO-GRN	RGB101 GRN return from Double RGB LED Board 87/88, J100-6
J102-33		Not Used	
J102-34		Not Used	
J102-13		Not Used	
J102-21		Not Used	
J102-29		Not Used	

J103 Middle Right RGB LED Control (RGB Cable 19-3095-19)


RGB LED 89 [Ori]

J103-1		BLK	+4VDC to Triple RGB LED Board 89/90/91, J100-1
J103-2		BLK-BLU	RGB100 BLU return from Triple RGB LED Board 89/90/91, J100-4
J103-3		BLK-RED	RGB100 RED return from Triple RGB LED Board 89/90/91, J100-3
J103-4		BLK-GRN	RGB100 GRN return from Triple RGB LED Board 89/90/91, J100-2


RGB LED 90 [Dori]

J103-6		BRN-BLU	RGB101 BLU return from Triple RGB LED Board 89/90/91, J100-7
J103-7		BRN-RED	RGB101 RED return from Triple RGB LED Board 89/90/91, J100-6
J103-8		BRN-GRN	RGB101 GRN return from Triple RGB LED Board 89/90/91, J100-5


RGB LED 91 [Nori]

J103-10		RED-BLU	RGB102 BLU return from Triple RGB LED Board 89/90/91, J100-10
J103-11		RED-GRY	RGB102 RED return from Triple RGB LED Board 89/90/91, J100-9
J103-12		RED-GRN	RGB102 GRN return from Triple RGB LED Board 89/90/91, J100-8


RGB LED 92 [Kili Arrow]

J103-13		ORN	+4VDC to Double RGB LED Board 92/93, J100-1
J103-14		ORN-BLU	RGB100 BLU return from Double RGB LED Board 92/93, J100-4
J103-15		ORN-RED	RGB100 RED return from Double RGB LED Board 92/93, J100-3
J103-16		ORN-GRN	RGB100 GRN return from Double RGB LED Board 92/93, J100-2


RGB LED 93 [Kili Parchment]

J103-18		YEL-BLU	RGB101 BLU return from Double RGB LED Board 92/93, J100-8
J103-19		YEL-RED	RGB101 RED return from Double RGB LED Board 92/93, J100-7
J103-20		YEL-GRN	RGB101 GRN return from Double RGB LED Board 92/93, J100-6


RGB LED 94 [EXTRA BALL]

J103-21		GRN	+4VDC to Triple RGB LED Board 94/95/96, J100-1
J103-22		GRN-BLU	RGB100 BLU return from Triple RGB LED Board 94/95/96, J100-4
J103-23		GRN-RED	RGB100 RED return from Triple RGB LED Board 94/95/96, J100-3
J103-24		GRN-GRY	RGB100 GRN return from Triple RGB LED Board 94/95/96, J100-2

RGB LED 95 [Radagast Parchment]

J103-26		BLU-GRY	RGB101 BLU return from Triple RGB LED Board 94/95/96, J100-7
J103-27		BLU-RED	RGB101 RED return from Triple RGB LED Board 94/95/96, J100-6
J103-28		BLU-GRN	RGB101 GRN return from Triple RGB LED Board 94/95/96, J100-5

RGB LED 96 [Radagast Arrow]

J103-30		VIO-BLU	RGB102 BLU return from Triple RGB LED Board 94/95/96, J100-10
J103-31		VIO-RED	RGB102 RED return from Triple RGB LED Board 94/95/96, J100-9
J103-32		VIO-GRN	RGB102 GRN return from Triple RGB LED Board 94/95/96, J100-8
J103-33		Not Used	
J103-34		Not Used	
J103-5		Not Used	

J103-9	Not Used
J103-17	Not Used
J103-25	Not Used
J103-29	Not Used

J104 UFM I2C Communications

CAT5 or higher Ethernet cable from RGB LED Controller Bd B, J105

J105 UFM I2C Communications

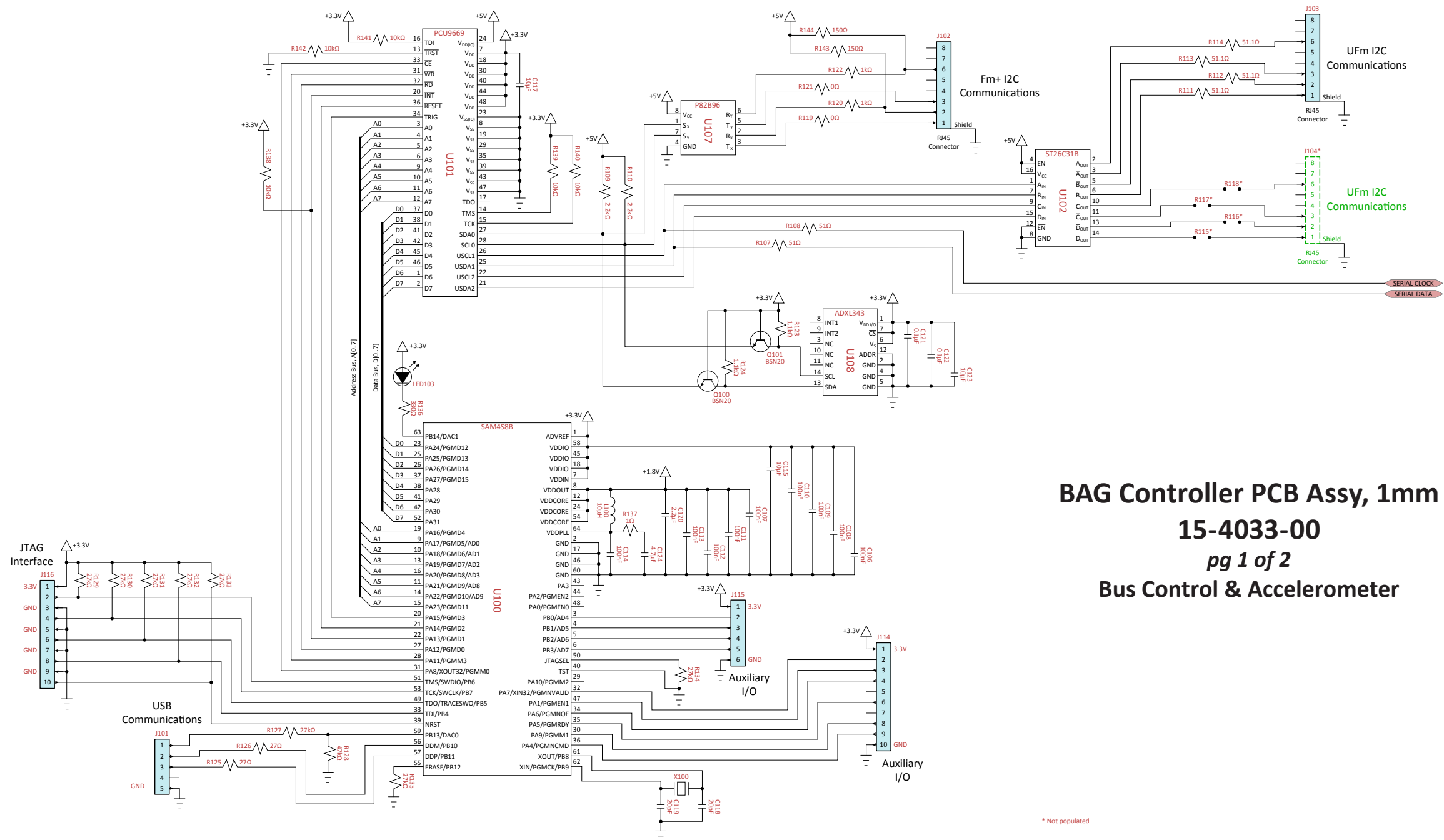
CAT5 or higher Ethernet cable to RGB LED Controller Bd A, J104

BAG Controller PCB Assy, 1mm

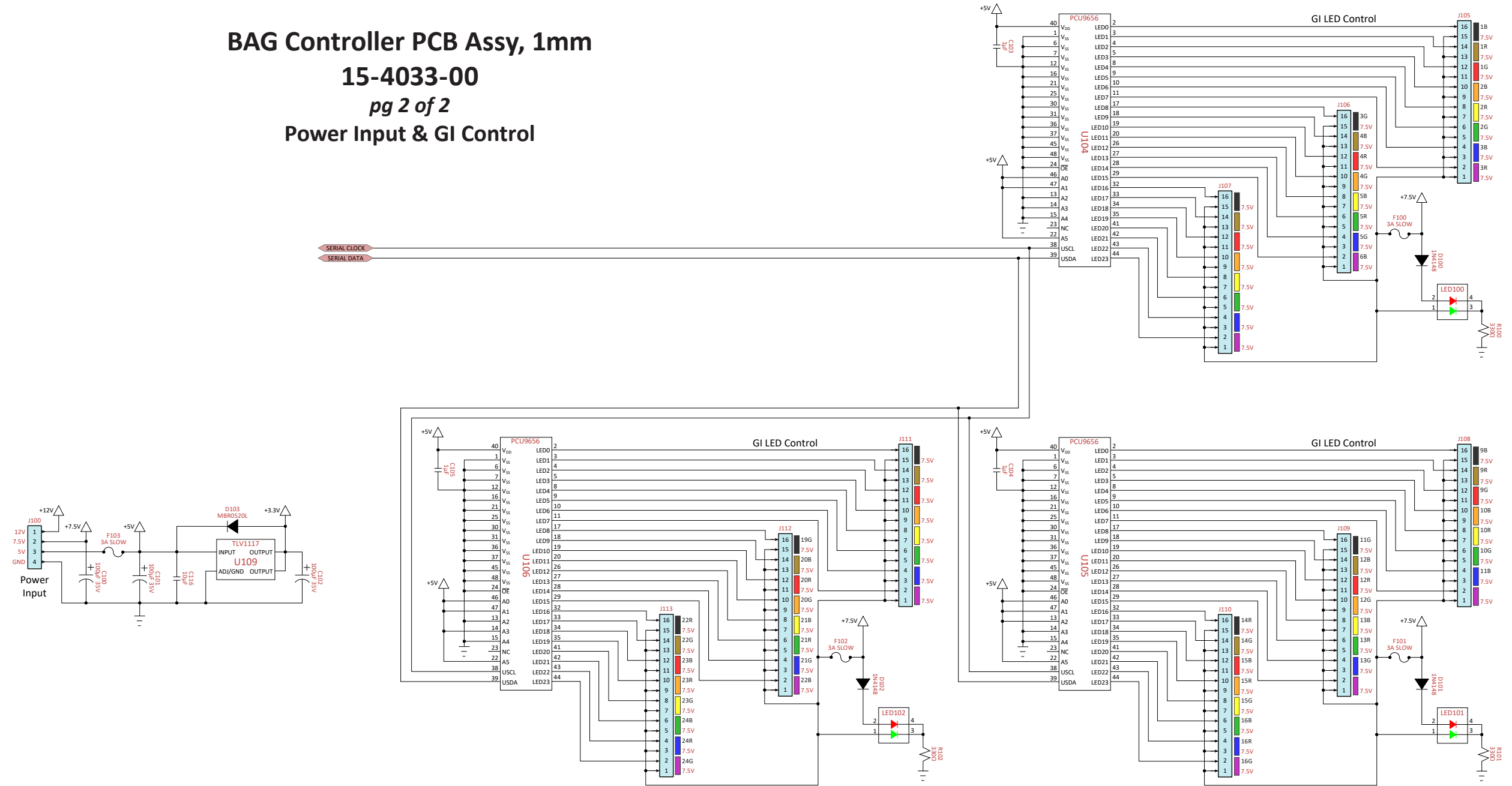
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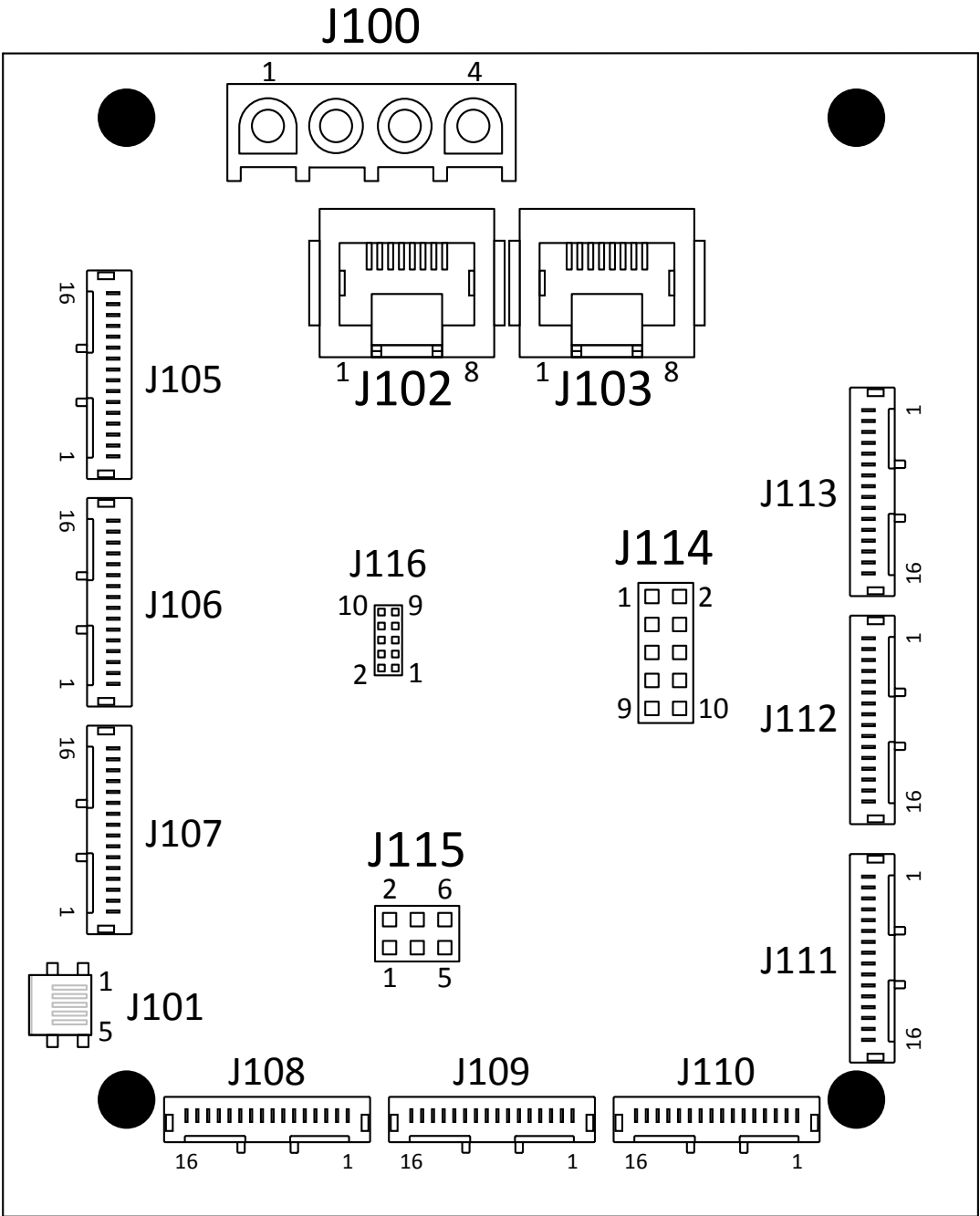
(games manufactured before Aug 11, 2016)

Component(s)	Part Number	Description	Component(s)	Part Number	Description
BARE PCB	15-0033-00	Bus, Accelerometer & GI Board, 1mm	R123, R124	122-01K1-104	Resistor, 0603 SMT, 1.1kΩ, 0.1W, 5%
C100-C102	109-100M-035	Capacitor, Elect (Radial), 100μF, 35V, 20%	R125, R126	122-0027-102	Resistor, 0603 SMT, 27Ω, 0.1W, 1%
C103-C105	103-105Z-016	Capacitor, MLCC, 0603 SMT, 1μF, 16V, +80%, -20%	R127, R129-R135	122-027K-104	Resistor, 0603 SMT, 27kΩ, 0.1W, 5%
C106-C114	103-104K-016	Capacitor, MLCC, 0603 SMT, 100nF, 16V, 10%	R128	122-047K-102	Resistor, 0603 SMT, 47kΩ, 0.1W, 1%
C115-C117	103-106M-016	Capacitor, MLCC, 0603 SMT, 10μF, 16V, 20%	R137	122-0001-104	Resistor, 0603 SMT, 1Ω, 0.1W, 5%
C118, C119	103-200J-050	Capacitor, MLCC, 0603 SMT, 20pF, 50V, 5%	R138-R142	122-010K-104	Resistor, 0603 SMT, 10kΩ, 0.1W, 5%
C120	103-225K-016	Capacitor, MLCC, 0603 SMT, 2.2μF, 16V, 10%	R143, R144	122-0150-102	Resistor, 0603 SMT, 150Ω, 0.1W, 1%
C121, C122	103-104K-025	Capacitor, MLCC, 0603 SMT, 0.1μF, 25V, 10%	U100	141-0021-0S	Microcontroller, 32-Bit, 120MHz, SAM4S8B, LQFP-64 SMT
C123	103-106M-006	Capacitor, MLCC, 0603 SMT, 10μF, 6.3V, 20%	U101	141-0022-0S	I2C-Bus Controller, UFM, 3-Ch, PCU9669B, LQFP-48 SMT
C124	103-475K-006	Capacitor, MLCC, 0603 SMT, 4.7μF, 6.3V, 10%	U102	140-0006-0S	Quad Diff Line Driver w/3-State Outputs, ST26C31B, TSSOP-16 SMT
D100-D102	110-1001-0S	Diode, 1N4148, SMT, 100V, 300mA	U104-U106	140-0005-0S	LED Driver, I2C-Bus, 24-Bit, 5MHz, PCU9656, LQFP-48 SMT
D103	110-0011-0S	Diode, MBR0520L, SMT, Schottky Rectifier, 0.5A	U107	141-0023-0S	Dual Bidirectional I2C-Bus Buffer, P82B96, SOT-505-8 SMT
F100-F103	170-6303-SS	Fuse, Slow, 1206 SMT, 3A, 63V	U108	141-0024-0S	Accelerometer, 3-Axis, I2C-Bus, ADXL343, LGA-14 SMT
L100	190-0008-0S	Inductor, SMD, 10μH, 350mA, 50MHz	U109	142-0009-0S	Voltage Regulator, TLV1117, SOT-223-4 SMT, 3.3V, 300mA
LED100-LED102	24-0020-0S	LED, 1210 SMD, RED/GRN, 569/621nm	X100	160-0003-0S	Crystal, 12MHz, 120-20-3X-TR, SMT, 20pF, 50PPM
LED103	24-0021-0S	LED, 0603 SMD, YEL, 571nm	J100	30-2005-04	Header, Male, 4-pin, 6.35mm
Q100, Q101	130-0006-0S	MOSFET, BSN20-7, N-Ch, SOT-23-3, 50V, 500mA	J101	31-2507-00	Receptacle, Mini USB 2.0, Type B, SMT
R100-R102, R136	122-0330-102	Resistor, 0603 SMT, 330Ω, 0.1W, 1%	J102, J103	30-2510-01	Jack Header, w/Shield, RJ45 (Ethernet)
R107, R108,			J104		Not Populated
R111-R114	122-51P1-102	Resistor, 0603 SMT, 51.1Ω, 0.1W, 1%	J105-J113	30-2200-16	Header, SMT, Male, 16-Pin, 1mm
R109, R110	122-02K2-104	Resistor, 0603 SMT, 2.2kΩ, 0.1W, 5%	J114	31-2513-10	Connector Header, Male, 10-pin, 2 Rows, 2.54mm
R115-R118		Not Populated	J115	31-2513-06	Connector Header, Male, 6-pin, 2 Rows, 2.54mm
R119, R121	122-0000-100	Resistor, 0603 SMT, 0Ω	J116	31-2514-10	Header, Male, 10-pin, 2 Rows, 1.27mm
R120, R122	122-001K-104	Resistor, 0603 SMT, 1kΩ, 0.1W, 5%			



BAG Controller PCB Assy, 1mm
15-4033-00
pg 2 of 2
Power Input & GI Control





BAG Controller PCB Assy, 1mm
15-4033-00
Connector Pin-outs

J100 DC Power Input

J100-1	Not Used	
J100-2	VIO	+7.5VDC from 7.5/4VDC Pwr Supply
J100-3	RED	+5VDC from Primary ATX Pwr Supply (jumped from RGB LED Controller Bd B, J100-2)
J100-4	BLK	Ground from 7.5/4VDC Pwr Supply

J101 USB Communications

USB Mini-B to 2.0 A cable, run from back of CPU (back of PCB chassis), USB port

J102 FM+ I2C Communications

CAT5 or higher Ethernet cable to Smaug Controller Bd, J101

J103 UFM I2C Communications

CAT5 or higher Ethernet cable to RGB LED Controller Bd B, J104









J104 UFM I2C Communications

Not Used (Not Populated)

J105 Lower Left GI Control (GI Cable 19-3092-01)

J105-1		GRY	+7.5V to GI Board 3R [Left Side #7 (Low)], J100-1
J105-2		GRY-VIO	LED return from GI Board 3R [Left Side #7 (Low)], J100-2
J105-3		GRY	+7.5V to GI Board 3B [Left Return #1 (High)], J100-1
J105-4		GRY-BLU	LED return from GI Board 3B [Left Return #1 (High)], J100-2
J105-5		GRY	+7.5V to GI Board 2G [Left Return #2], J100-1
J105-6		GRY-GRN	LED return from GI Board 2G [Left Return #2], J100-2
J105-7		GRY	+7.5V to GI Board 2R [Left Return #3], J100-1
J105-8		GRY-YEL	LED return from GI Board 2R [Left Return #3], J100-2
J105-9		GRY	+7.5V to GI Board 2B [Left Return #4 (Low)], J100-1
J105-10		GRY-ORN	LED return from GI Board 2B [Left Return #4 (Low)], J100-2
J105-11		GRY	+7.5V to GI Board 1G [Left Sling #3 (Low)], J100-1
J105-12		GRY-RED	LED return from GI Board 1G [Left Sling #3 (Low)], J100-2
J105-13		GRY	+7.5V to GI Board 1R [Left Sling #2], J100-1
J105-14		GRY-BRN	LED return from GI Board 1R [Left Sling #2], J100-2
J105-15		GRY	+7.5V to GI Board 1B [Left Sling #1 (High)], J100-1
J105-16		GRY-BLK	LED return from GI Board 1B [Left Sling #1 (High)], J100-2








J106 Left Side GI Control (GI Cable 19-3092-03)

J106-1		GRY	+7.5V to GI Board 6B [Smaug Area #3], J100-1
J106-2		GRY-VIO	LED return from GI Board 6B [Smaug Area #3], J100-2
J106-3		GRY	+7.5V to GI Board 5G [Smaug Area #4 (Low)], J100-1
J106-4		GRY-BLU	LED return from GI Board 5G [Smaug Area #4 (Low)], J100-2
J106-5		GRY	+7.5V to GI Board 5R [Left Side #1 (High)], J100-1
J106-6		GRY-GRN	LED return from GI Board 5R [Left Side #1 (High)], J100-2
J106-7		GRY	+7.5V to GI Board 5B [Left Side #2], J100-1
J106-8		GRY-YEL	LED return from GI Board 5B [Left Side #2], J100-2
J106-9		GRY	+7.5V to GI Board 4G [Left Side #3], J100-1
J106-10		GRY-ORN	LED return from GI Board 4G [Left Side #3], J100-2
J106-11		GRY	+7.5V to GI Board 4R [Left Side #4], J100-1
J106-12		GRY-RED	LED return from GI Board 4R [Left Side #4], J100-2
J106-13		GRY	+7.5V to GI Board 4B [Left Side #5], J100-1
J106-14		GRY-BRN	LED return from GI Board 4B [Left Side #5], J100-2
J106-15		GRY	+7.5V to GI Board 3G [Left Side #6], J100-1
J106-16		GRY-BLK	LED return from GI Board 3G [Left Side #6], J100-2

J107 GI Control

J107-1	Not Used
J107-2	Not Used
J107-3	Not Used
J107-4	Not Used
J107-5	Not Used
J107-6	Not Used
J107-7	Not Used
J107-8	Not Used
J107-9	Not Used
J107-10	Not Used
J107-11	Not Used
J107-12	Not Used
J107-13	Not Used
J107-14	Not Used
J107-15	Not Used
J107-16	Not Used

J108 Upper Left GI Control (GI Cable 19-3092-05)

J108-1	Not Used		
J108-2	Not Used		
J108-3		GRY	+7.5V to GI Board 11B [Captive Ball Target #2 (Low)], J100-1
J108-4		GRY-BLU	LED return from GI Board 11B [Captive Ball Target #2 (Low)], J100-2
J108-5		GRY	+7.5V to GI Board 10G [Captive Ball Target #1 (High)], J100-1
J108-6		GRY-GRN	LED return from GI Board 10G [Captive Ball Target #1 (High)], J100-2
J108-7		GRY	+7.5V to GI Board 10R [Smaug Area #1 (High)], J100-1
J108-8		GRY-YEL	LED return from GI Board 10R [Smaug Area #1 (High)], J100-2
J108-9		GRY	+7.5V to GI Board 10B [Smaug Area #2], J100-1
J108-10		GRY-ORN	LED return from GI Board 10B [Smaug Area #2], J100-2
J108-11		GRY	+7.5V to GI Board 9G [Upper Left Corner #1 (High)], J100-1
J108-12		GRY-RED	LED return from GI Board 9G [Upper Left Corner #1 (High)], J100-2
J108-13		GRY	+7.5V to GI Board 9R [Upper Left Corner #2], J100-1
J108-14		GRY-BRN	LED return from GI Board 9R [Upper Left Corner #2], J100-2
J108-15		GRY	+7.5V to GI Board 9B [Upper Left Corner #3 (Low)], J100-1
J108-16		GRY-BLK	LED return from GI Board 9B [Upper Left Corner #3 (Low)], J100-2

J109 Left/Right Side Flasher Control (Flasher Cable 19-3092-06)

J109-1	Not Used		
J109-2	Not Used		
J109-3	GRY	+7.5V to GI Board 13G [Ramp U-Turn Diverter], J100-1	
J109-4	GRY-BLU	LED return from GI Board 13G [Ramp U-Turn Diverter], J100-2	
J109-5	GRY	+7.5V to GI Board 13R [Right Upper Flasher], J100-1	
J109-6	GRY-GRN	LED return from GI Board 13R [Right Upper Flasher], J100-2	
J109-7	GRY	+7.5V to GI Board 13B [Right Middle Flasher], J100-1	
J109-8	GRY-YEL	LED return from GI Board 13B [Right Middle Flasher], J100-2	
J109-9	GRY	+7.5V to GI Board 12G [Right Lower Flasher], J100-1	
J109-10	GRY-ORN	LED return from GI Board 12G [Right Lower Flasher], J100-2	
J109-11	GRY	+7.5V to GI Board 12R [Left Lower Flasher], J100-1	
J109-12	GRY-RED	LED return from GI Board 12R [Left Lower Flasher], J100-2	
J109-13	GRY	+7.5V to GI Board 12B [Left Middle Flasher], J100-1	
J109-14	GRY-BRN	LED return from GI Board 12B [Left Middle Flasher], J100-2	
J109-15	GRY	+7.5V to GI Board 11G [Left Upper Flasher], J100-1	
J109-16	GRY-BLK	LED return from GI Board 11G [Left Upper Flasher], J100-2	

J110 Pop-Ups/Smaug Lighting Control (Cable 19-3092-07)

J110-1	VIO	+7.5V to GI Board 16G [Smaug Right Eye], J100-1, thru 6-pin inline connector	
J110-2	GRY-VIO	LED return from GI Board 16G [Smaug Right Eye], J100-2, thru 6-pin inline connector	
J110-3	GRY	+7.5V to GI Board 16R [Smaug Left Eye], J100-1, thru 6-pin inline connector	
J110-4	GRY-BLU	LED return from GI Board 16R [Smaug Left Eye], J100-2, thru 6-pin inline connector	
J110-5	GRY	+7.5V to GI Board 16B [Back Panel Insert Flasher], J100-1	
J110-6	GRY-GRN	LED return from GI Board 16B [Back Panel Insert Flasher], J100-2	
J110-7	GRY	+7.5V to GI Board 15G [Smaug Gold Pile Flasher], J100-1	
J110-8	GRY-YEL	LED return from GI Board 15G [Smaug Gold Pile Flasher], J100-2	
J110-9	GRY	+7.5V to GI Board 15R [Warg Pop-Up], J100-1	
J110-10	GRY-ORN	LED return from GI Board 15R [Warg Pop-Up], J100-2	
J110-11	GRY	+7.5V to GI Board 15B [Orc Pop-Up], J100-1	
J110-12	GRY-RED	LED return from GI Board 15B [Orc Pop-Up], J100-2	
J110-13	GRY	+7.5V to GI Board 14G [Goblin Pop-Up], J100-1	
J110-14	GRY-BRN	LED return from GI Board 14G [Goblin Pop-Up], J100-2	
J110-15	GRY	+7.5V to GI Board 14R [Spider Pop-Up], J100-1	
J110-16	GRY-BLK	LED return from GI Board 14R [Spider Pop-Up], J100-2	

J111 GI Control

J111-1	Not Used
J111-2	Not Used
J111-3	Not Used
J111-4	Not Used
J111-5	Not Used
J111-6	Not Used
J111-7	Not Used
J111-8	Not Used
J111-9	Not Used
J111-10	Not Used
J111-11	Not Used
J111-12	Not Used
J111-13	Not Used
J111-14	Not Used
J111-15	Not Used
J111-16	Not Used

J112 Right/Upper Right GI Control (GI Cable 19-3092-04)

J112-1	GRY	+7.5V to GI Board 22B [Upper Right Corner #1 (High)], J100-1	
J112-2	GRY-VIO	LED return from GI Board 22B [Upper Right Corner #1 (High)], J100-2	
J112-3	GRY	+7.5V to GI Board 21G [Upper Right Corner #2], J100-1	
J112-4	GRY-BLU	LED return from GI Board 21G [Upper Right Corner #2], J100-2	
J112-5	GRY	+7.5V to GI Board 21R [Upper Right Corner #3 (Low)], J100-1	
J112-6	GRY-GRN	LED return from GI Board 21R [Upper Right Corner #3 (Low)], J100-2	
J112-7	GRY	+7.5V to GI Board 21B [Right Pop Bumper #1 (High)], J100-1	
J112-8	GRY-YEL	LED return from GI Board 21B [Right Pop Bumper #1 (High)], J100-2	
J112-9	GRY	+7.5V to GI Board 20G [Right Pop Bumper #2 (Low)], J100-1	
J112-10	GRY-ORN	LED return from GI Board 20G [Right Pop Bumper #2 (Low)], J100-2	
J112-11	GRY	+7.5V to GI Board 20R [Right Side #1 (High)], J100-1	
J112-12	GRY-RED	LED return from GI Board 20R [Right Side #1 (High)], J100-2	
J112-13	GRY	+7.5V to GI Board 20B [Right Side #2], J100-1	
J112-14	GRY-BRN	LED return from GI Board 20B [Right Side #2], J100-2	
J112-15	GRY	+7.5V to GI Board 19G [Right Side #3], J100-1	
J112-16	GRY-BLK	LED return from GI Board 19G [Right Side #3], J100-2	

J113 Lower Right GI Control (GI Cable 19-3092-02)

J113-1		GRY	+7.5V to GI Board 24G [Right Side #4], J100-1
J113-2		GRY-VIO	LED return from GI Board 24G [Right Side #4], J100-2
J113-3		GRY	+7.5V to GI Board 24R [Right Side #5 (Low)], J100-1
J113-4		GRY-BLU	LED return from GI Board 24R [Right Side #5 (Low)], J100-2
J113-5		GRY	+7.5V to GI Board 24B [Right Return #1 (High)], J100-1
J113-6		GRY-GRN	LED return from GI Board 24B [Right Return #1 (High)], J100-2
J113-7		GRY	+7.5V to GI Board 23G [Right Return #2], J100-1
J113-8		GRY-YEL	LED return from GI Board 23G [Right Return #2], J100-2
J113-9		GRY	+7.5V to GI Board 23R [Right Return #3 (Low)], J100-1
J113-10		GRY-ORN	LED return from GI Board 23R [Right Return #3 (Low)], J100-2
J113-11		GRY	+7.5V to GI Board 23B [Right Sling #3 (Low)], J100-1
J113-12		GRY-RED	LED return from GI Board 23B [Right Sling #3 (Low)], J100-2
J113-13		GRY	+7.5V to GI Board 22G [Right Sling #2], J100-1
J113-14		GRY-BRN	LED return from GI Board 22G [Right Sling #2], J100-2
J113-15		GRY	+7.5V to GI Board 22R [Right Sling #1 (High)], J100-1
J113-16		GRY-BLK	LED return from GI Board 22R [Right Sling #1 (High)], J100-2

J114 Auxiliary I/O

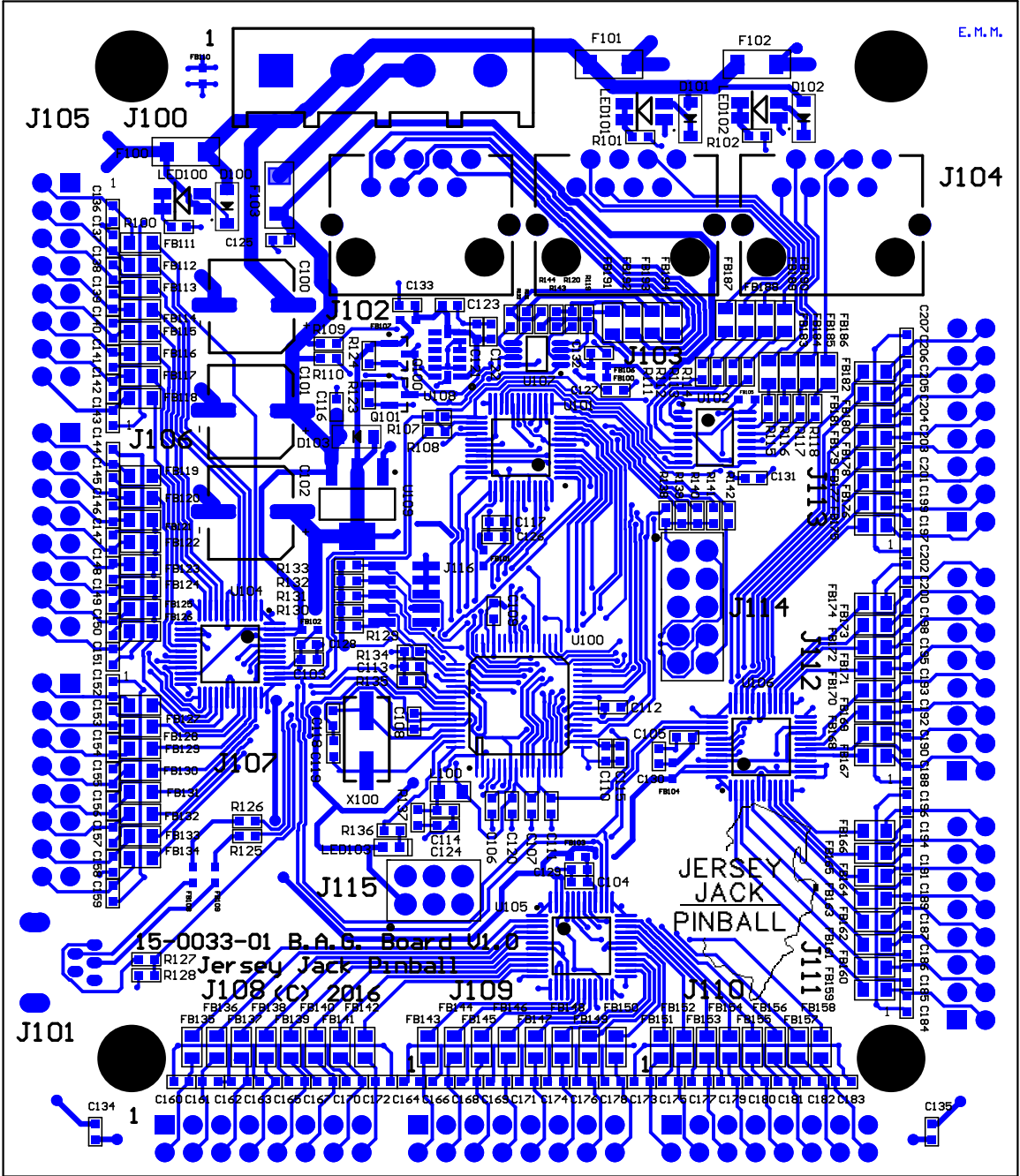
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J114-8	Not Used
J114-9	Not Used
J114-10	Not Used

J115 Auxiliary I/O

J115-1	Not Used
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J115-4	Not Used
J115-5	Not Used
J115-6	Not Used

J116 JTAG Interface

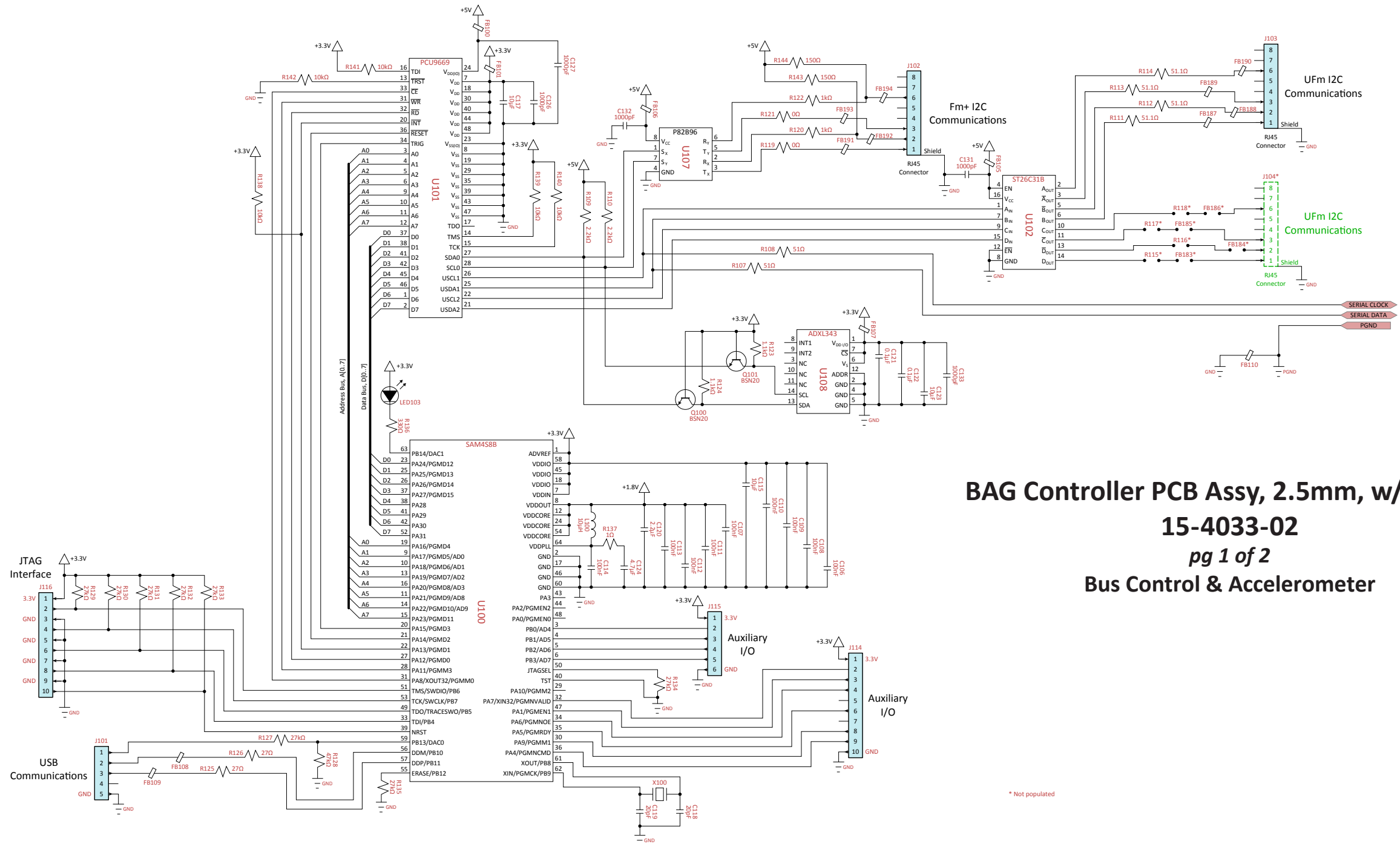
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J116-2	Not Used
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J116-4	Not Used
J116-5	Not Used
J116-6	Not Used
J116-7	Not Used
J116-8	Not Used
J116-9	Not Used
J116-10	Not Used



BAG Controller PCB Assy, 2.5mm, w/Ferrites 15-4033-02

(games manufactured on/after Aug 11, 2016)

Component(s)	Part Number	Description	Component(s)	Part Number	Description
BARE PCB	15-0033-01	Bus, Accelerometer & GI Controller Bd, 2.5mm	R120, R122	122-001K-104	Resistor, 0603 SMT, 1kΩ, 0.1W, 5%
C100-C102	109-100M-035	Capacitor, Elect (Radial), 100μF, 35V, 20%	R123, R124	122-01K1-104	Resistor, 0603 SMT, 1.1kΩ, 0.1W, 5%
C103-C105	103-105Z-016	Capacitor, MLCC, 0603 SMT, 1μF, 16V, +80%, -20%	R125, R126	122-0027-102	Resistor, 0603 SMT, 27Ω, 0.1W, 1%
C106-C114, C121, C122	103-104K-025	Capacitor, MLCC, 0603 SMT, 0.1μF, 25V, 10%	R127, R129-R135	122-027K-104	Resistor, 0603 SMT, 27kΩ, 0.1W, 5%
C115-C117	103-106M-016	Capacitor, MLCC, 0603 SMT, 10μF, 16V, 20%	R128	122-047K-102	Resistor, 0603 SMT, 47kΩ, 0.1W, 1%
C118, C119	103-200J-050	Capacitor, MLCC, 0603 SMT, 20pF, 50V, 5%	R137	122-0001-104	Resistor, 0603 SMT, 1Ω, 0.1W, 5%
C120	103-225K-016	Capacitor, MLCC, 0603 SMT, 2.2μF, 16V, 10%	R138-R142	122-010K-104	Resistor, 0603 SMT, 10kΩ, 0.1W, 5%
C123	103-106M-006	Capacitor, MLCC, 0603 SMT, 10μF, 6.3V, 20%	R143, R144	122-0150-102	Resistor, 0603 SMT, 150Ω, 0.1W, 1%
C124	103-475K-006	Capacitor, MLCC, 0603 SMT, 4.7μF, 6.3V, 10%	R115-R118		Not Populated
C125-C207	103-102K-050	Capacitor, MLCC, 0603 SMT, 1000pF, 50V, 10%	U100	141-0021-0S	Microcontroller, 32-Bit, 120MHz, SAM4S8B, LQFP-64 SMT
D103	110-0011-0S	Diode, MBR0520L, SMT, Schottky Rectifier, 0.5A	U101	141-0022-0S	I2C-Bus Controller, UFM, 3-Ch, PCU9669B, LQFP-48 SMT
D100-D102	110-1001-0S	Diode, 1N4148, SMT, 100V, 300mA	U102	140-0006-0S	Quad Diff Line Driver w/3-State Outputs, ST26C31B, TSSOP-16 SMT
F100-F103	170-6303-SS	Fuse, Slow, 1206 SMT, 3A, 63V	U104-U106	140-0005-0S	LED Driver, I2C-Bus, 24-Bit, 5MHz, PCU9656, LQFP-48 SMT
FB100-FB110	195-5002-0S	EMI Filter Bead, 0603 SMT, 2.2kΩ at 100MHz, 150mA	U107	141-0023-0S	Dual Bidirectional I2C-Bus Buffer, P82B96, SOT-505-8 SMT
FB111-FB182,			U108	141-0024-0S	Accelerometer, 3-Axis, I2C-Bus, ADXL343, LGA-14 SMT
FB187-FB194	195-5003-0S	EMI Filter Bead, 0805 SMT, 2.5kΩ at 100MHz, 200mA	U109	142-0009-0S	Voltage Regulator, TLV1117, SOT-223-4 SMT, 3.3V, 300mA
FB183-FB186		Not Populated	X100	160-0003-0S	Crystal, 12MHz, 120-20-3X-TR, SMT, 20pF, 50PPM
L100	190-0008-0S	Inductor, SMD, 10μH, 350mA, 50MHz	J100	30-2005-04	Header, Male, 4-pin, 6.35mm
LED100-LED102	24-0020-0S	LED, 1210 SMD, RED/GRN, 569/621nm	J101	31-2507-01	Receptacle, Mini USB 2.0, Type B
LED103	24-0021-0S	LED, 0603 SMD, YEL, 571nm	J102, J103	30-2510-01	Jack Header, w/Shield, RJ45 (Ethernet)
Q100, Q101	130-0006-0S	MOSFET, BSN20-7, N-Ch, SOT-23-3, 50V, 500mA	J104		Not Populated
R100-R102, R136	122-0330-102	Resistor, 0603 SMT, 330Ω, 0.1W, 1%	J105-J113	30-2203-16	Header, Male, 16-Pin, 2 Rows, 2.5mm
R107, R108, R111-R114	122-51P1-102	Resistor, 0603 SMT, 51.1Ω, 0.1W, 1%	J114	31-2513-10	Connector Header, Male, 10-pin, 2 Rows, 2.54mm
R109, R110	122-02K2-104	Resistor, 0603 SMT, 2.2kΩ, 0.1W, 5%	J115	31-2513-06	Connector Header, Male, 6-pin, 2 Rows, 2.54mm
R119, R121	122-0000-100	Resistor, 0603 SMT, 0Ω	J116	31-2514-10	Header, Male, 10-pin, 2 Rows, 1.27mm

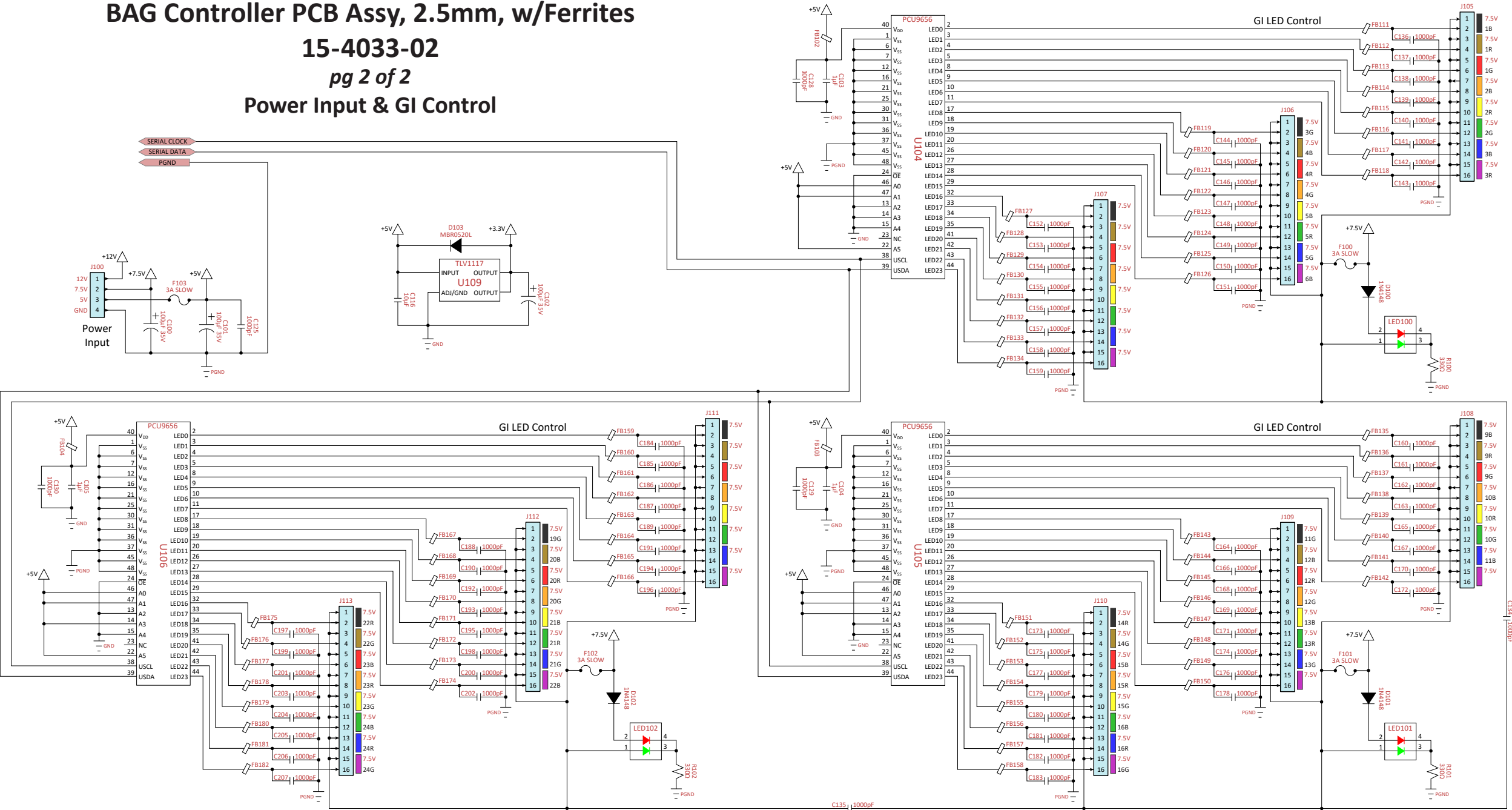


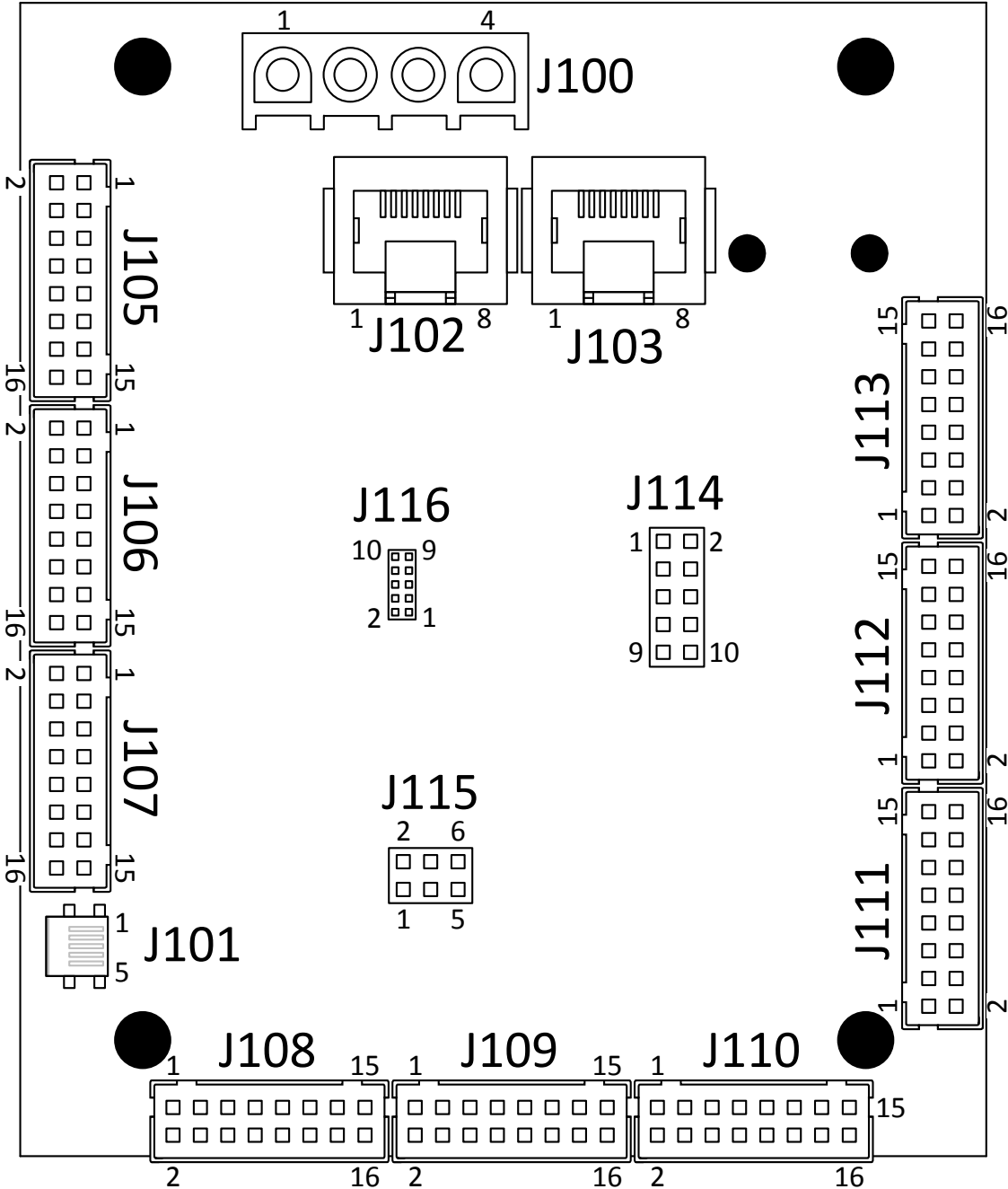
BAG Controller PCB Assy, 2.5mm, w/Ferrites

15-4033-02

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Power Input & GI Control





BAG Controller PCB Assy, 2.5mm, w/Ferrites
15-4033-02
Connector Pin-outs

J100 DC Power Input

J100-1	Not Used	
J100-2	VIO	+7.5VDC from 7.5/4VDC Pwr Supply
J100-3	RED	+5VDC from Primary ATX Pwr Supply (jumped from RGB LED Controller Bd B, J100-2)
J100-4	BLK	Ground from 7.5/4VDC Pwr Supply

J101 USB Communications

USB Mini-B to 2.0 A cable, run from back of CPU (back of PCB chassis), USB port

J102 FM+ I2C Communications

CAT5 or higher Ethernet cable to Smaug Controller Bd, J101


J103 UFM I2C Communications

CAT5 or higher Ethernet cable to RGB LED Controller Bd B, J104

















J104 UFM I2C Communications

Not Used (Not Populated)

J105 Lower Left GI Control (GI Cable 19-3092-11)

J105-1		GRY	+7.5V to GI Board 1B [Left Sling #1 (High)], J100-1
J105-2		GRY-BLK	LED return from GI Board 1B [Left Sling #1 (High)], J100-2
J105-3		GRY	+7.5V to GI Board 1R [Left Sling #2], J100-1
J105-4		GRY-BRN	LED return from GI Board 1R [Left Sling #2], J100-2
J105-5		GRY	+7.5V to GI Board 1G [Left Sling #3 (Low)], J100-1
J105-6		GRY-RED	LED return from GI Board 1G [Left Sling #3 (Low)], J100-2
J105-7		GRY	+7.5V to GI Board 2B [Left Return #4 (Low)], J100-1
J105-8		GRY-ORN	LED return from GI Board 2B [Left Return #4 (Low)], J100-2
J105-9		GRY	+7.5V to GI Board 2R [Left Return #3], J100-1
J105-10		GRY-YEL	LED return from GI Board 2R [Left Return #3], J100-2
J105-11		GRY	+7.5V to GI Board 2G [Left Return #2], J100-1
J105-12		GRY-GRN	LED return from GI Board 2G [Left Return #2], J100-2
J105-13		GRY	+7.5V to GI Board 3B [Left Return #1 (High)], J100-1
J105-14		GRY-BLU	LED return from GI Board 3B [Left Return #1 (High)], J100-2
J105-15		GRY	+7.5V to GI Board 3R [Left Side #7 (Low)], J100-1
J105-16		GRY-VIO	LED return from GI Board 3R [Left Side #7 (Low)], J100-2















J106 Left Side GI Control (GI Cable 19-3092-13)

J106-1		GRY	+7.5V to GI Board 3G [Left Side #6], J100-1
J106-2		GRY-BLK	LED return from GI Board 3G [Left Side #6], J100-2
J106-3		GRY	+7.5V to GI Board 4B [Left Side #5], J100-1
J106-4		GRY-BRN	LED return from GI Board 4B [Left Side #5], J100-2
J106-5		GRY	+7.5V to GI Board 4R [Left Side #4], J100-1
J106-6		GRY-RED	LED return from GI Board 4R [Left Side #4], J100-2
J106-7		GRY	+7.5V to GI Board 4G [Left Side #3], J100-1
J106-8		GRY-ORN	LED return from GI Board 4G [Left Side #3], J100-2
J106-9		GRY	+7.5V to GI Board 5B [Left Side #2], J100-1
J106-10		GRY-YEL	LED return from GI Board 5B [Left Side #2], J100-2
J106-11		GRY	+7.5V to GI Board 5R [Left Side #1 (High)], J100-1
J106-12		GRY-GRN	LED return from GI Board 5R [Left Side #1 (High)], J100-2
J106-13		GRY	+7.5V to GI Board 5G [Smaug Area #4 (Low)], J100-1
J106-14		GRY-BLU	LED return from GI Board 5G [Smaug Area #4 (Low)], J100-2
J106-15		GRY	+7.5V to GI Board 6B [Smaug Area #3], J100-1
J106-16		GRY-VIO	LED return from GI Board 6B [Smaug Area #3], J100-2






J107 GI Control

J107-1	Not Used
J107-2	Not Used
J107-3	Not Used
J107-4	Not Used
J107-5	Not Used
J107-6	Not Used
J107-7	Not Used
J107-8	Not Used
J107-9	Not Used
J107-10	Not Used
J107-11	Not Used
J107-12	Not Used
J107-13	Not Used
J107-14	Not Used
J107-15	Not Used
J107-16	Not Used

















J108 Upper Left GI Control (GI Cable 19-3092-15)

J108-1		GRY	+7.5V to GI Board 9B [Upper Left Corner #3 (Low)], J100-1
J108-2		GRY-BLK	LED return from GI Board 9B [Upper Left Corner #3 (Low)], J100-2
J108-3		GRY	+7.5V to GI Board 9R [Upper Left Corner #2], J100-1
J108-4		GRY-BRN	LED return from GI Board 9R [Upper Left Corner #2], J100-2
J108-5		GRY	+7.5V to GI Board 9G [Upper Left Corner #1 (High)], J100-1
J108-6		GRY-RED	LED return from GI Board 9G [Upper Left Corner #1 (High)], J100-2
J108-7		GRY	+7.5V to GI Board 10B [Smaug Area #2], J100-1
J108-8		GRY-ORN	LED return from GI Board 10B [Smaug Area #2], J100-2
J108-9		GRY	+7.5V to GI Board 10R [Smaug Area #1 (High)], J100-1
J108-10		GRY-YEL	LED return from GI Board 10R [Smaug Area #1 (High)], J100-2
J108-11		GRY	+7.5V to GI Board 10G [Captive Ball Target #1 (High)], J100-1
J108-12		GRY-GRN	LED return from GI Board 10G [Captive Ball Target #1 (High)], J100-2
J108-13		GRY	+7.5V to GI Board 11B [Captive Ball Target #2 (Low)], J100-1
J108-14		GRY-BLU	LED return from GI Board 11B [Captive Ball Target #2 (Low)], J100-2
J108-15	Not Used		
J108-16	Not Used		

J109 Left/Right Side Flasher Control (Flasher Cable 19-3092-16)

J109-1		GRY	+7.5V to GI Board 11G [Left Upper Flasher], J100-1
J109-2		GRY-BLK	LED return from GI Board 11G [Left Upper Flasher], J100-2
J109-3		GRY	+7.5V to GI Board 12B [Left Middle Flasher], J100-1
J109-4		GRY-BRN	LED return from GI Board 12B [Left Middle Flasher], J100-2
J109-5		GRY	+7.5V to GI Board 12R [Left Lower Flasher], J100-1
J109-6		GRY-RED	LED return from GI Board 12R [Left Lower Flasher], J100-2
J109-7		GRY	+7.5V to GI Board 12G [Right Lower Flasher], J100-1
J109-8		GRY-ORN	LED return from GI Board 12G [Right Lower Flasher], J100-2
J109-9		GRY	+7.5V to GI Board 13B [Right Middle Flasher], J100-1
J109-10		GRY-YEL	LED return from GI Board 13B [Right Middle Flasher], J100-2
J109-11		GRY	+7.5V to GI Board 13R [Right Upper Flasher], J100-1
J109-12		GRY-GRN	LED return from GI Board 13R [Right Upper Flasher], J100-2
J109-13		GRY	+7.5V to GI Board 13G [Ramp U-Turn Diverter], J100-1
J109-14		GRY-BLU	LED return from GI Board 13G [Ramp U-Turn Diverter], J100-2
J109-15		Not Used	
J109-16		Not Used	

















J110 Pop-Ups/Smaug Lighting Control (Cable 19-3092-17)

J110-1		GRY	+7.5V to GI Board 14R [Spider Pop-Up], J100-1
J110-2		GRY-BLK	LED return from GI Board 14R [Spider Pop-Up], J100-2
J110-3		GRY	+7.5V to GI Board 14G [Goblin Pop-Up], J100-1
J110-4		GRY-BRN	LED return from GI Board 14G [Goblin Pop-Up], J100-2
J110-5		GRY	+7.5V to GI Board 15B [Orc Pop-Up], J100-1
J110-6		GRY-RED	LED return from GI Board 15B [Orc Pop-Up], J100-2
J110-7		GRY	+7.5V to GI Board 15R [Warg Pop-Up], J100-1
J110-8		GRY-ORN	LED return from GI Board 15R [Warg Pop-Up], J100-2
J110-9		GRY	+7.5V to GI Board 15G [Smaug Gold Pile Flasher], J100-1
J110-10		GRY-YEL	LED return from GI Board 15G [Smaug Gold Pile Flasher], J100-2
J110-11		GRY	+7.5V to GI Board 16B [Back Panel Insert Flasher], J100-1
J110-12		GRY-GRN	LED return from GI Board 16B [Back Panel Insert Flasher], J100-2
J110-13		GRY	+7.5V to GI Board 16R [Smaug Left Eye], J100-1, thru 6-pin inline connector
J110-14		GRY-BLU	LED return from GI Board 16R [Smaug Left Eye], J100-2, thru 6-pin inline connector
J110-15		VIO	+7.5V to GI Board 16G [Smaug Right Eye], J100-1, thru 6-pin inline connector
J110-16		GRY-VIO	LED return from GI Board 16G [Smaug Right Eye], J100-2, thru 6-pin inline connector

J111 GI Control

J111-1		Not Used
J111-2		Not Used
J111-3		Not Used
J111-4		Not Used
J111-5		Not Used
J111-6		Not Used
J111-7		Not Used
J111-8		Not Used
J111-9		Not Used
J111-10		Not Used
J111-11		Not Used
J111-12		Not Used
J111-13		Not Used
J111-14		Not Used
J111-15		Not Used
J111-16		Not Used

J112 Right/Upper Right GI Control (GI Cable 19-3092-14)

J112-1		GRY	+7.5V to GI Board 19G [Right Side #3], J100-1
J112-2		GRY-BLK	LED return from GI Board 19G [Right Side #3], J100-2
J112-3		GRY	+7.5V to GI Board 20B [Right Side #2], J100-1
J112-4		GRY-BRN	LED return from GI Board 20B [Right Side #2], J100-2
J112-5		GRY	+7.5V to GI Board 20R [Right Side #1 (High)], J100-1
J112-6		GRY-RED	LED return from GI Board 20R [Right Side #1 (High)], J100-2
J112-7		GRY	+7.5V to GI Board 20G [Right Pop Bumper #2 (Low)], J100-1
J112-8		GRY-ORN	LED return from GI Board 20G [Right Pop Bumper #2 (Low)], J100-2
J112-9		GRY	+7.5V to GI Board 21B [Right Pop Bumper #1 (High)], J100-1
J112-10		GRY-YEL	LED return from GI Board 21B [Right Pop Bumper #1 (High)], J100-2
J112-11		GRY	+7.5V to GI Board 21R [Upper Right Corner #3 (Low)], J100-1
J112-12		GRY-GRN	LED return from GI Board 21R [Upper Right Corner #3 (Low)], J100-2
J112-13		GRY	+7.5V to GI Board 21G [Upper Right Corner #2], J100-1
J112-14		GRY-BLU	LED return from GI Board 21G [Upper Right Corner #2], J100-2
J112-15		GRY	+7.5V to GI Board 22B [Upper Right Corner #1 (High)], J100-1
J112-16		GRY-VIO	LED return from GI Board 22B [Upper Right Corner #1 (High)], J100-2

J113 Lower Right GI Control (GI Cable 19-3092-12)

J113-1		GRY	+7.5V to GI Board 22R [Right Sling #1 (High)], J100-1
J113-2		GRY-BLK	LED return from GI Board 22R [Right Sling #1 (High)], J100-2
J113-3		GRY	+7.5V to GI Board 22G [Right Sling #2], J100-1
J113-4		GRY-BRN	LED return from GI Board 22G [Right Sling #2], J100-2
J113-5		GRY	+7.5V to GI Board 23B [Right Sling #3 (Low)], J100-1
J113-6		GRY-RED	LED return from GI Board 23B [Right Sling #3 (Low)], J100-2
J113-7		GRY	+7.5V to GI Board 23R [Right Return #3 (Low)], J100-1
J113-8		GRY-ORN	LED return from GI Board 23R [Right Return #3 (Low)], J100-2
J113-9		GRY	+7.5V to GI Board 23G [Right Return #2], J100-1
J113-10		GRY-YEL	LED return from GI Board 23G [Right Return #2], J100-2
J113-11		GRY	+7.5V to GI Board 24B [Right Return #1 (High)], J100-1
J113-12		GRY-GRN	LED return from GI Board 24B [Right Return #1 (High)], J100-2
J113-13		GRY	+7.5V to GI Board 24R [Right Side #5 (Low)], J100-1
J113-14		GRY-BLU	LED return from GI Board 24R [Right Side #5 (Low)], J100-2
J113-15		GRY	+7.5V to GI Board 24G [Right Side #4], J100-1
J113-16		GRY-VIO	LED return from GI Board 24G [Right Side #4], J100-2

J114 Auxiliary I/O

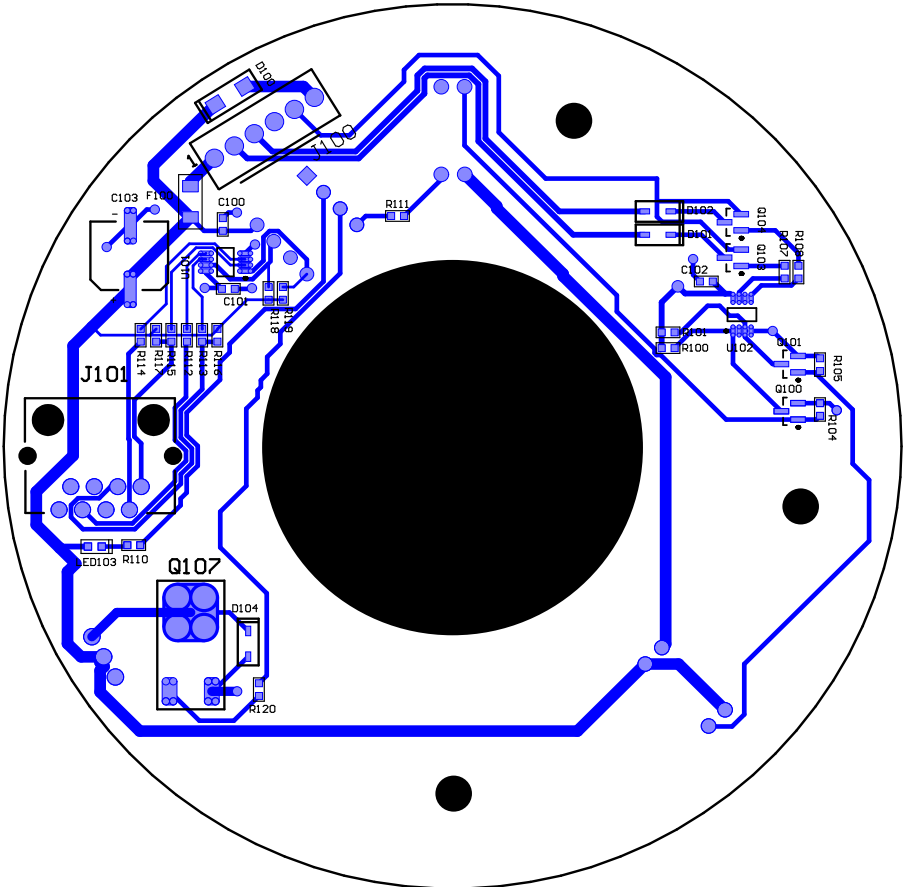
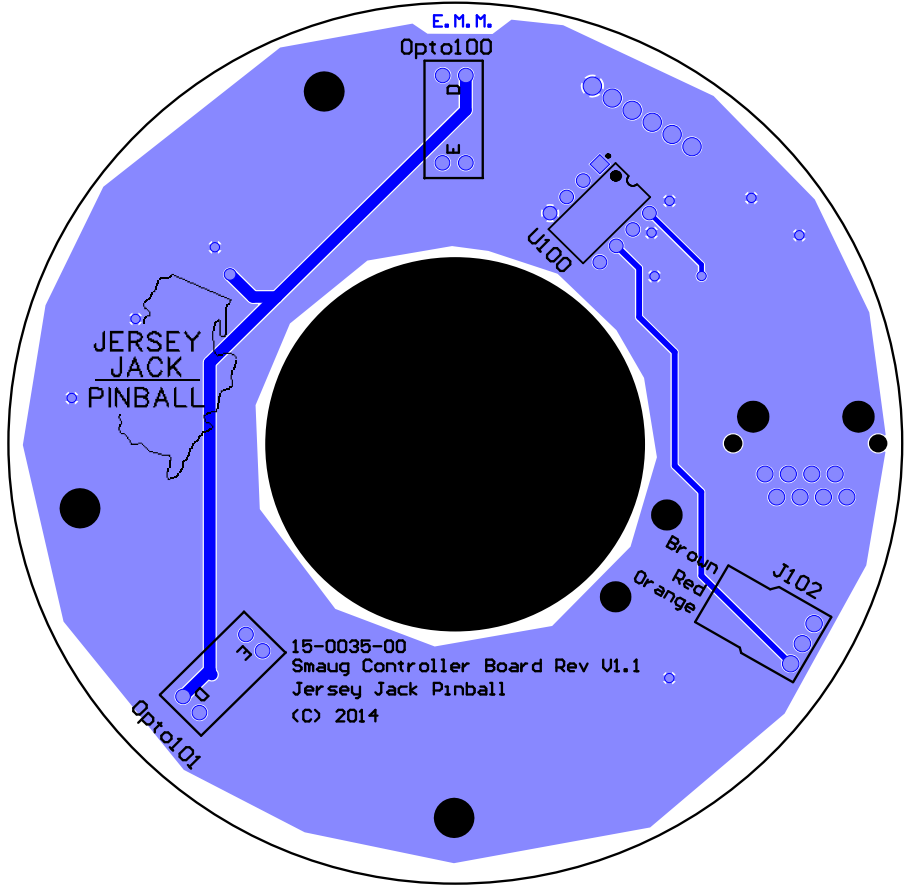
J114-1	Not Used
J114-2	Not Used
J114-3	Not Used
J114-4	Not Used
J114-5	Not Used
J114-6	Not Used
J114-7	Not Used
J114-8	Not Used
J114-9	Not Used
J114-10	Not Used

J115 Auxiliary I/O

J115-1	Not Used
J115-2	Not Used
J115-3	Not Used
J115-4	Not Used
J115-5	Not Used
J115-6	Not Used

J116 JTAG Interface

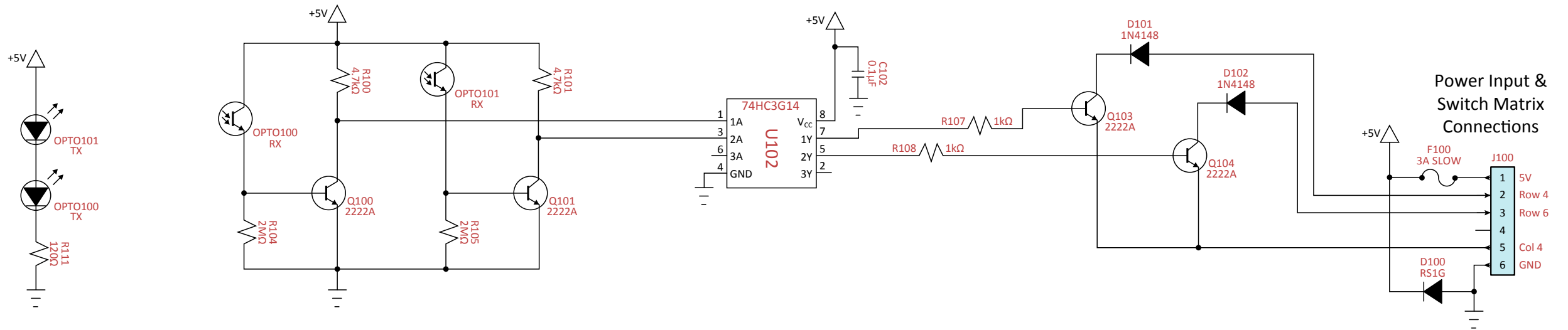
J116-1	Not Used
J116-2	Not Used
J116-3	Not Used
J116-4	Not Used
J116-5	Not Used
J116-6	Not Used
J116-7	Not Used
J116-8	Not Used
J116-9	Not Used
J116-10	Not Used



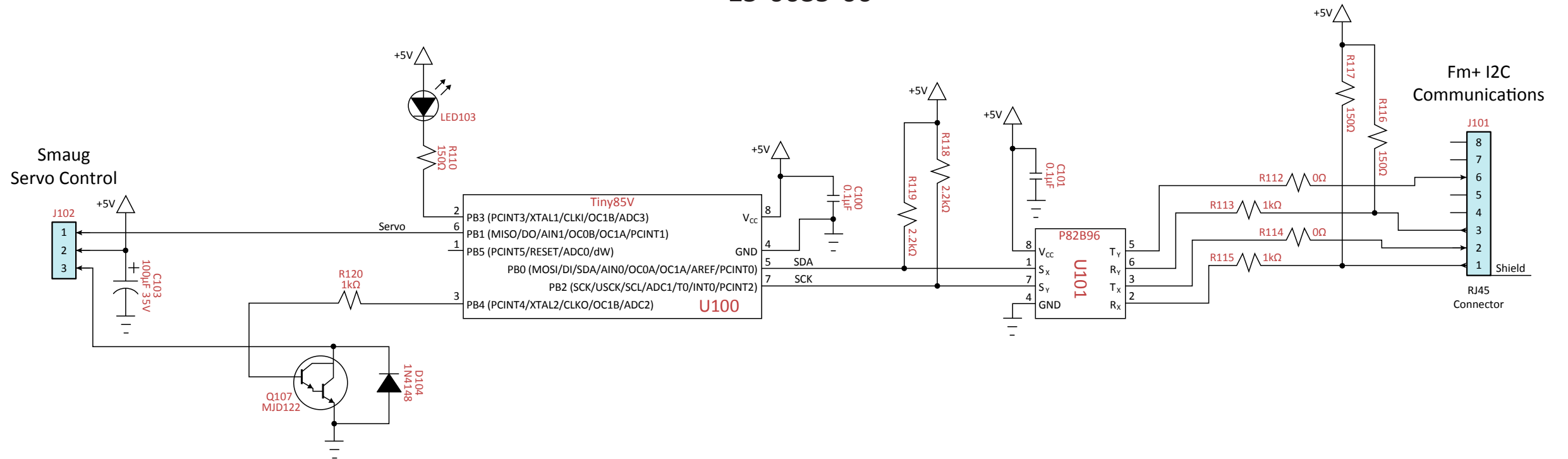
Hobbit Smaug Controller Board
15-0035-00

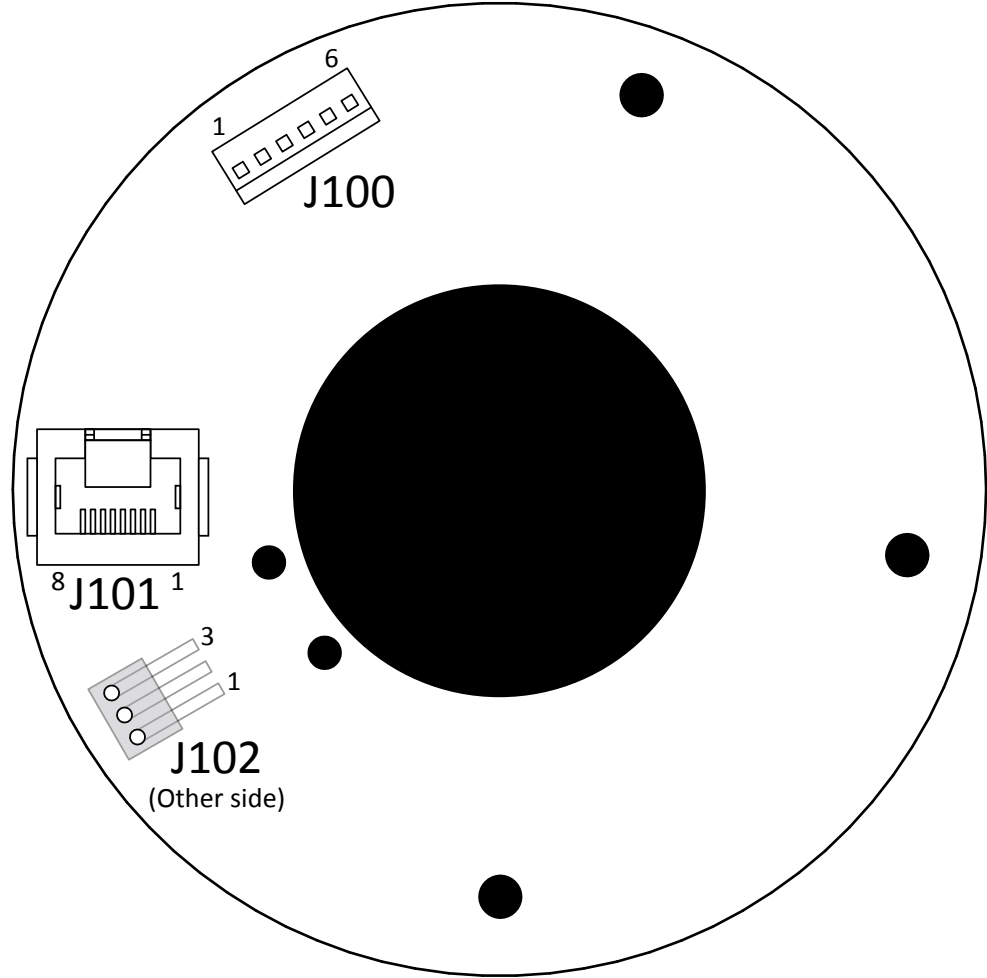
Component(s)	Part Number	Description
C100-C102	103-104K-025	Capacitor, MLCC, 0603 SMT, 0.1μF, 25V, 10%
C103	109-100M-035	Capacitor, Elect (Radial), 100μF, 35V, 20%
D100	110-5001-0S	Diode, RS1G, SMT, 400V, 1A, 150ns
D101, D102, D104	110-0012-0S	Diode, 1N4148, SMT, 75V, 150mA
F100	170-6303-SS	Fuse, Slow, 1206 SMT, 3A, 63V
LED103	24-0021-0S	LED, 0603 SMD, YEL, 571nm
OPTO100, OPTO101	18-5004-0T	U-Shaped Opto, OPB855, PCB Through-Hole Mount
Q100, Q101,		
Q103, Q104	131-0000-0S	Transistor, 2222A, SOT-23 SMT, NPN
Q107	131-0002-0S	Transistor, Darlington, MJD122, TO-252-3 SMT, NPN
R100, R101	122-04K7-104	Resistor, 0603 SMT, 4.7kΩ, 0.1W, 5%
R104, R105	122-002M-104	Resistor, 0603 SMT, 2MΩ, 0.1W, 5%

Component(s)	Part Number	Description
R107, R108, R113,		
R115, R120	122-001K-104	Resistor, 0603 SMT, 1kΩ, 0.1W, 5%
R110, R116, R117	122-0150-102	Resistor, 0603 SMT, 150Ω, 0.1W, 1%
R111	122-0120-104	Resistor, 0603 SMT, 120Ω, 0.1W, 5%
R112, R114	122-0000-100	Resistor, 0603 SMT, 0Ω
R118, R119	122-02K2-104	Resistor, 0603 SMT, 2.2kΩ, 0.1W, 5%
U100	31-3001-08	DIP Socket, 8-pin, 2.54mm Pitch
U100	141-0025-0T	Microcontroller, 8-Bit, 10MHz, Tiny85V, PDIP-8
U101	141-0023-0S	Dual Bidirectional I2C-Bus Buffer, P82B96, SOT-505-8 SMT
U102	141-0026-0S	Triple Inverters, Schmitt Trigger, 74HC3G14, TSSOP-8 SMT
J100	31-2504-06	Header, Male, 6-pin, 2.54mm
J101	30-2510-01	Jack Header, w/Shield, RJ45 (Ethernet)
J102	31-2515-03	Header, Male, 3-pin, Rt Angle, 2.54mm



Hobbit Smaug Controller Board 15-0035-00





Hobbit Smaug Controller Board
15-0035-00
Connector Pin-outs

J100 Power Input/Switch Matrix Connections

J100-1	RED	+5VDC from Primary ATX Pwr Supply
J100-2	WHT-ORN	Matrixed switches, Row 4 from I/O Board, J200-4
J100-3	WHT-GRN	Matrixed switches, Row 6 from I/O Board, J200-6
J100-4	Not Used	
J100-5	GRN-ORN	Matrixed switches, Column 4 from I/O Board, J201-4
J100-6	BLK	Ground from Primary ATX Pwr Supply

J101 FM+ I2C Communications

CAT5 or higher Ethernet cable from BAG Controller Bd, J102

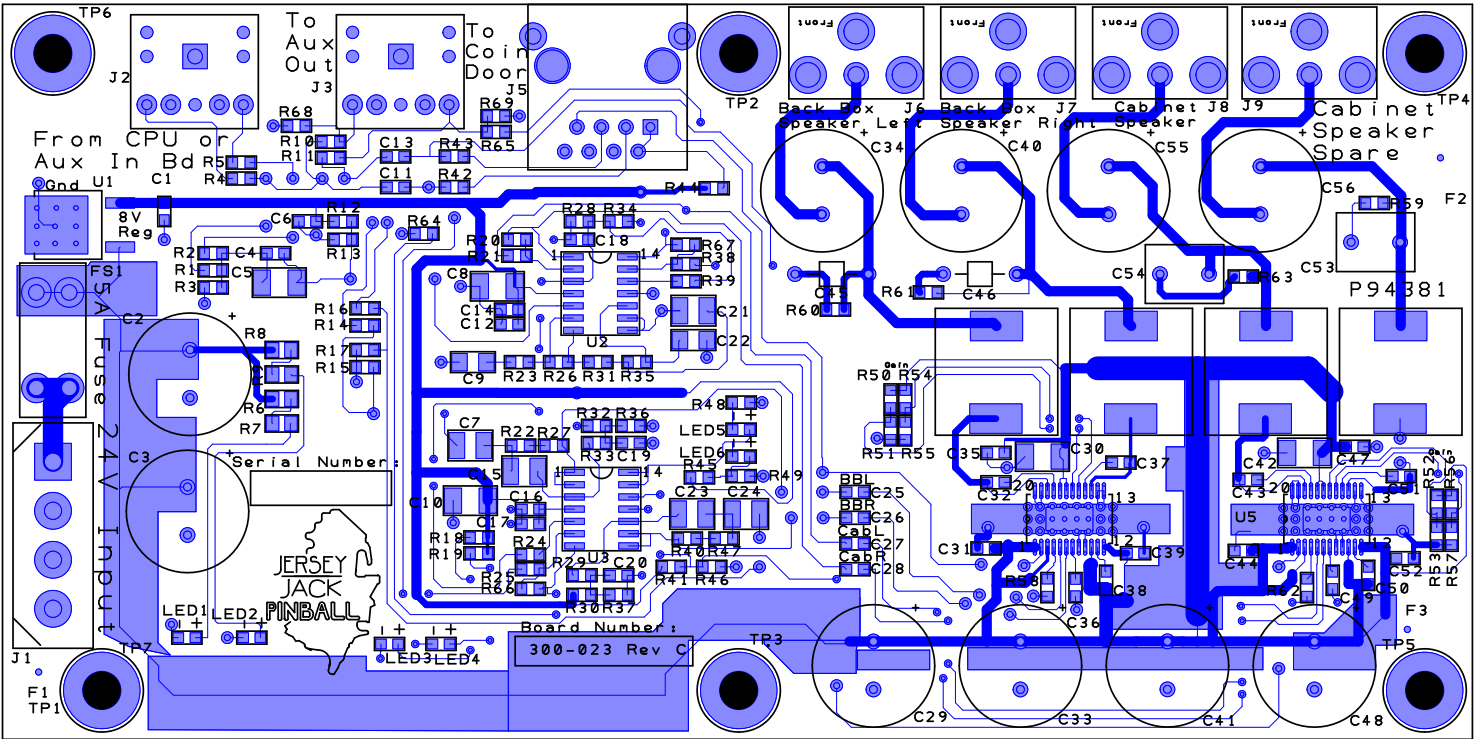
J102 Smaug Servo Control

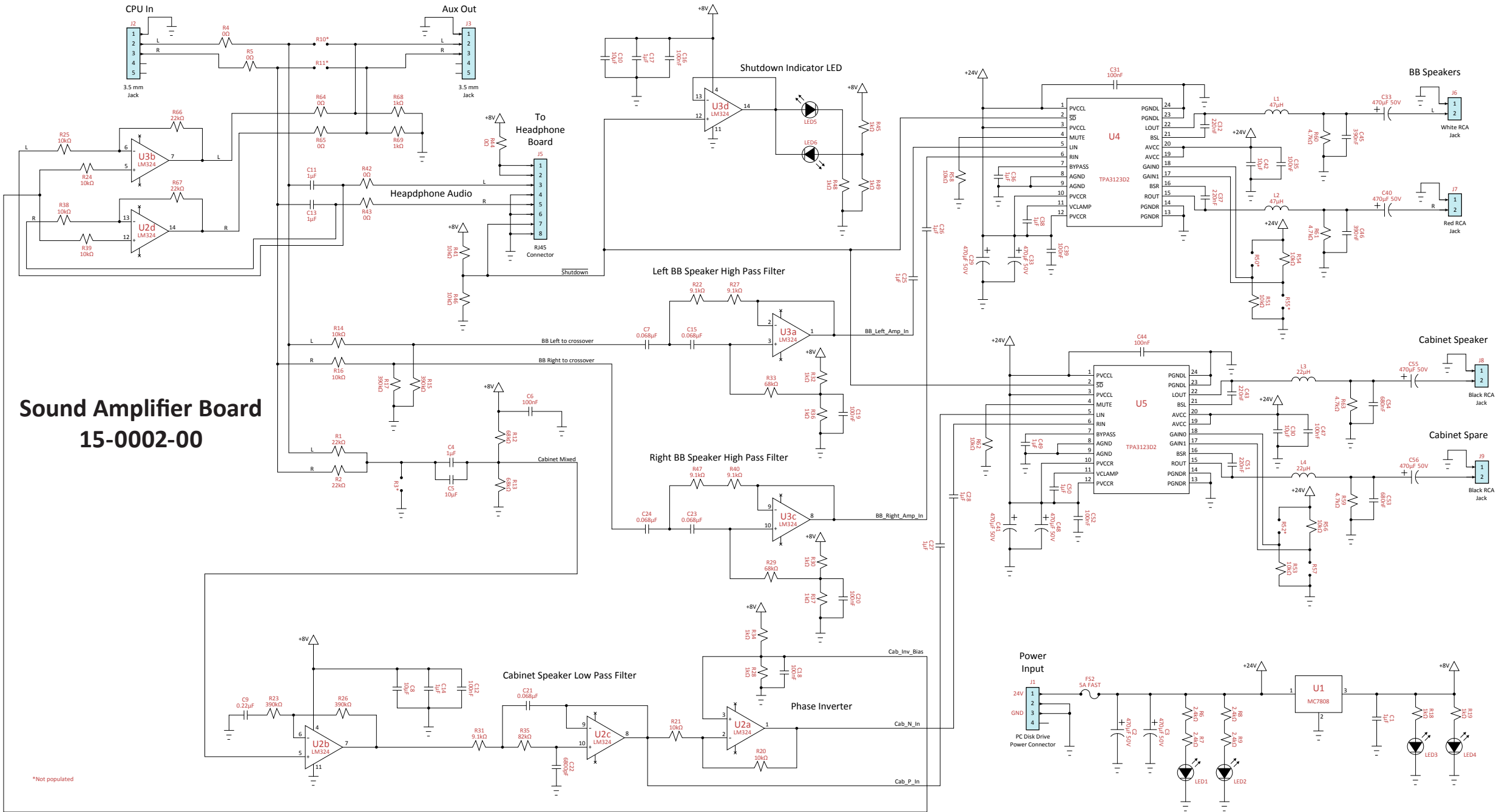
J102-1	ORN	Servo control to Smaug assembly
J102-2	RED	+5V to Smaug assembly
J102-3	BRN	Switched Ground to Smaug assembly

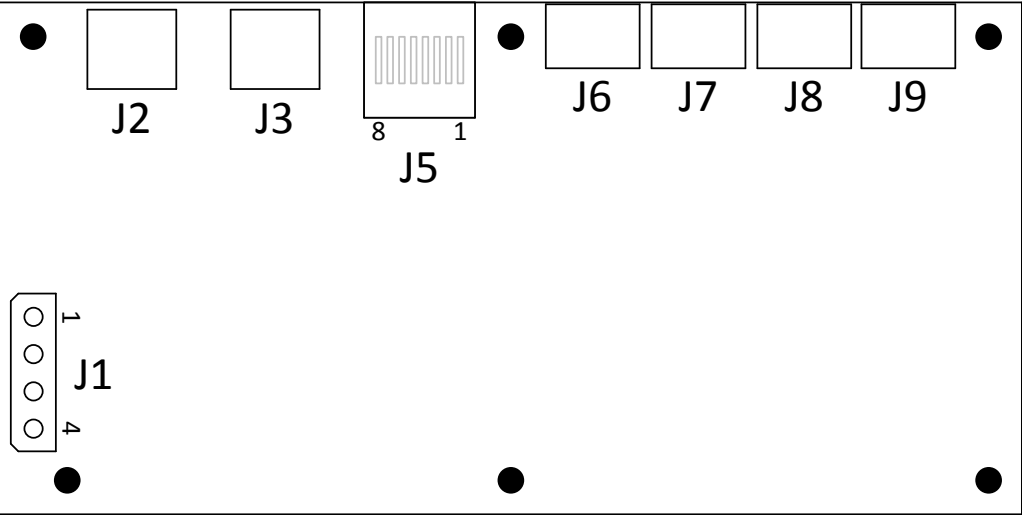
Sound Amplifier Board, 15-0002-00

Component(s)	Part Number	Description
C1, C4, C11, C13, C14, C17, C25-C28, C36, C38, C49, C50	103-105K-025	Capacitor, MLCC, 0603 SMT, 1µF, 25V, 10%
C2, C3, C29, C33, C34, C40, C41, C48, C55, C56	109-470M-050	Capacitor, Elect (Radial), 470µF, 50V, 20%
C5, C8, C10, C30, C42	102-106M-050	Capacitor, MLCC, 1210 SMT, 10µF, 50V, 20%
C6, C12, C16, C18-C20, C31, C35, C39, C44, C47, C52	103-104K-050	Capacitor, MLCC, 0603 SMT, 100nF, 50V, 10%
C7, C15, C21, C23, C24	102-683G-016	Capacitor, MLCC, 1210 SMT, 0.068µF, 16V, 20%
C9	102-224M-016	Capacitor, MLCC, 1206 SMT, 0.22µF, 16V, 20%
C22	102-682G-050	Capacitor, MLCC, 1206 SMT, 6800pF, 50V, 2%
C32, C37, C43, C51	103-224K-050	Capacitor, MLCC, 0603 SMT, 220nF, 50V, 10%
C45, C46	104-394J-100	Capacitor, Polyester, Leaded, 390nF, 100V, 5%
C53, C54	104-684J-050	Capacitor, Polyester, Leaded, 680nF, 50V, 5%
FS1	22-8006-00	Fuse Holder, Mini Blade, 20A, 500V
FS1	170-3205-SB	Fuse, Fast-Acting, 5A, 32V, Mini Blade
L1, L2	190-0000-0S	Inductor, SMD, 470µH, 2.5A, 1kHz
L3, L4	190-0001-0S	Inductor, SMD, 22µH, 3.6A, 1kHz
LED1-LED5	24-0009-0S	LED, 0603 SMD, YEL/GRN, 572nm
LED6	24-0010-0S	LED, 0603 SMD, YEL, 589nm
R1, R2, R66, R67	122-022K-102	Resistor, 0603 SMT, 22kΩ, 0.1W, 1%
R4, R5, R42-R44, R64, R65	122-0000-100	Resistor, 0603 SMT, 0Ω, 0.1W
R6-R9	122-02K4-122	Resistor, 0603 SMT, 2.4kΩ, 0.125W, 5%
R12, R13, R29, R33	122-068K-102	Resistor, 0603 SMT, 68kΩ, 0.1W, 1%
R14, R16, R20, R21, R24, R25, R38, R39, R41, R46, R51, R53, R54, R56, R58, R62	122-010K-102	Resistor, 0603 SMT, 10kΩ, 0.1W, 1%
R15, R17, R23, R26	122-390K-102	Resistor, 0603 SMT, 390kΩ, 0.1W, 1%
R18, R19, R28, R30, R32, R34, R36, R37, R45, R48, R49, R68, R69	122-001K-102	Resistor, 0603 SMT, 1kΩ, 0.1W, 1%

Component(s)	Part Number	Description
R22, R27, R31, R40, R47	122-09K1-102	Resistor, 0603 SMT, 9.1kΩ, 0.1W, 1%
R35	122-082K-102	Resistor, 0603 SMT, 82kΩ, 0.1W, 1%
R59-R61, R63	122-04K7-102	Resistor, 0603 SMT, 4.7kΩ, 0.1W, 1%
R3, R10, R11, R50, R52, R55, R57		Not Populated
U1	142-0002-0S	Voltage Regulator, MC7808, TO-252-3 SMT, 8V, 1A
U2, U3	140-0003-0S	Op Amp, Quad, LM324, SO-14 SMT
U4, U5	140-0004-0S	Audio Amp, Stereo, TPA3123, HTSSOP-24 SMT
J1	31-2502-04	Connector Header, 4-pin, Power
J2	30-2506-05	Jack Header, 3.5mm, Rt Angle, Green
J3	30-2506-12	Jack Header, 3.5mm, Rt Angle, Pink
J5	30-2508-00	Jack Header, RJ45 (Ethernet)
J6	30-2507-09	Jack Header, RCA, Right Angle, White
J7	30-2507-02	Jack Header, RCA, Right Angle, Red
J8, J9	30-2507-00	Jack Header, RCA, Right Angle, Black





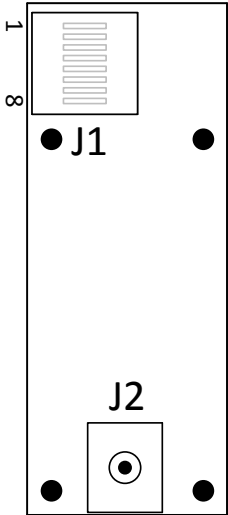
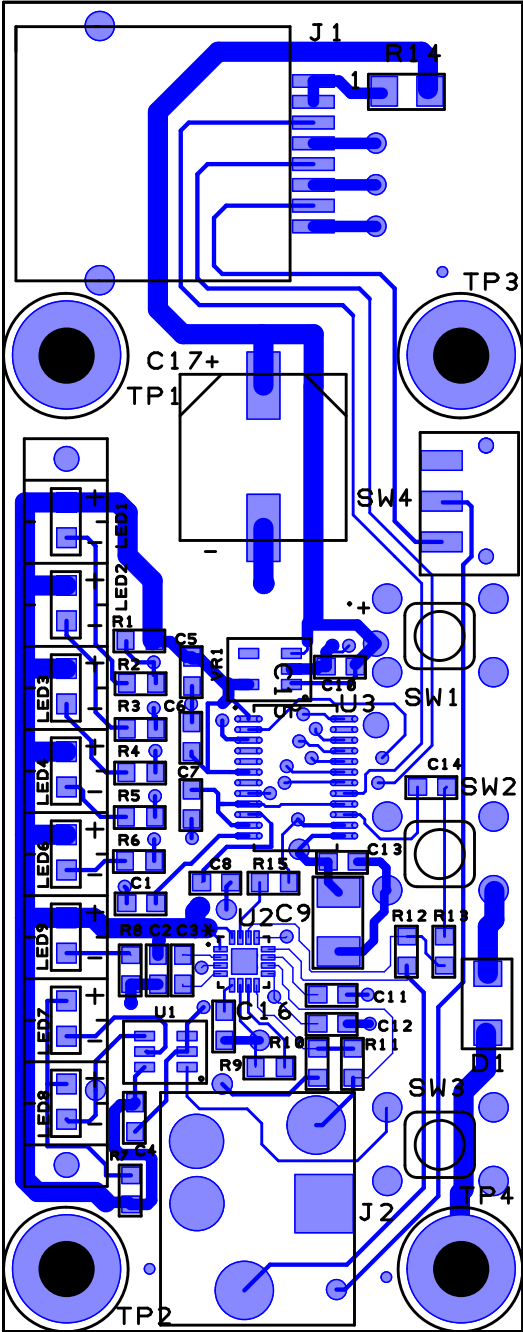


Sound Amplifier Board, 15-0002-00
Connector Pin-outs

J1 DC Power Input			J5 Headphone/Volume Control Connection		
J1-1	BRN	+24VDC from Primary ATX Pwr Supply	RJ45 cable to Volume Control Board (on back of coin door), J1		
J1-2	Not Used				
J1-3	BLK	Ground from Primary ATX Pwr Supply	J6 Backbox Speaker Connection (Left)		
J1-4	Not Used		WHT RCA cable to Backbox Speaker Bar (left side RCA jack)		
J2 Audio Input			J7 Backbox Speaker Connection (Right)		
3.5mm audio cable from CPU Board (audio out), through Ground Loop Isolator			RED RCA cable to Backbox Speaker Bar (right side RCA jack)		
J3 Auxiliary Output			J8 Cabinet Speaker Connection		
3.5mm audio cable to Jack in the Back Assy (in back of cabinet)			BLK RCA cable to cabinet subwoofer speaker		
			J9 Cabinet Speaker Spare		
			Not Used		

Volume Control Board
15-0013-00

Component(s)	Part Number	Description
C1-C5, C10, C12, C16	103-105K-025	Capacitor, MLCC, 0603 SMT, 1μF, 25V, 10%
C6, C11, C13	103-104K-050	Capacitor, MLCC, 0603 SMT, 100nF, 50V, 10%
C7	103-101K-050	Capacitor, MLCC, 0603 SMT, 100pF, 50V, 10%
C17	109-470M-050	Capacitor, Elect (Radial), 470μF, 50V, 20%
C8, C14	103-474K-025	Capacitor, MLCC, 0603 SMT, 0.47μF, 25V, 10%
C9	102-106M-050	Capacitor, MLCC, 1210 SMT, 10μF, 50V, 20%
D1	110-0003-0S	Diode, TVS, SMAJ12CA, SMT, 400W, 12V
LED1-LED4, LED6, LED7, LED9	24-0011-0S	LED, 0805 SMD, GRN, 565nm
LED5	24-0012-0S	LED Light Pipes, 8 pos, 3mm, Vertical, SMD
LED8	24-0013-0S	LED, 0805 SMD, YEL, 585nm
R1	122-1M00-102	Resistor, 0603 SMT, 1MΩ, 0.1W, 1%
R2-R8	122-0220-102	Resistor, 0603 SMT, 220Ω, 0.1W, 1%
R9, R11, R12, R15	122-010K-102	Resistor, 0603 SMT, 10kΩ, 0.1W, 1%
R10, R13	122-04K7-102	Resistor, 0603 SMT, 4.7kΩ, 0.1W, 1%
R14	124-0010-502	Resistor, 1206 SMT, 10Ω, 0.5W, 1%
SW1-SW3	18-8000-0T	Switch, Tactile, 6x13mm, 50mA, SPST, 160g
SW4	18-8001-0S	Switch, Slide, 0.3A, SPDT, SMT
U1	140-0005-0S	On/Off Controller w/ Debounce, MAX16054, SOT-23-6 SMT
U2	140-0006-0S	Audio Amp, Headphone, MAX97220B, TQFN-16 SMT
U3	140-0007-0S	Volume Control, Stereo, MAX5486, TSSOP-24 SMT
VR1	142-0003-0S	Voltage Regulator, MC78PC50, SOT-23-5 SMT, 5V, 150mA
J1	30-2509-00	Jack Header, RJ45 (Ethernet), SMT
J2	30-2506-00	Jack Header, 3.5mm, Vertical, Black



Volume Control Board
15-0013-00

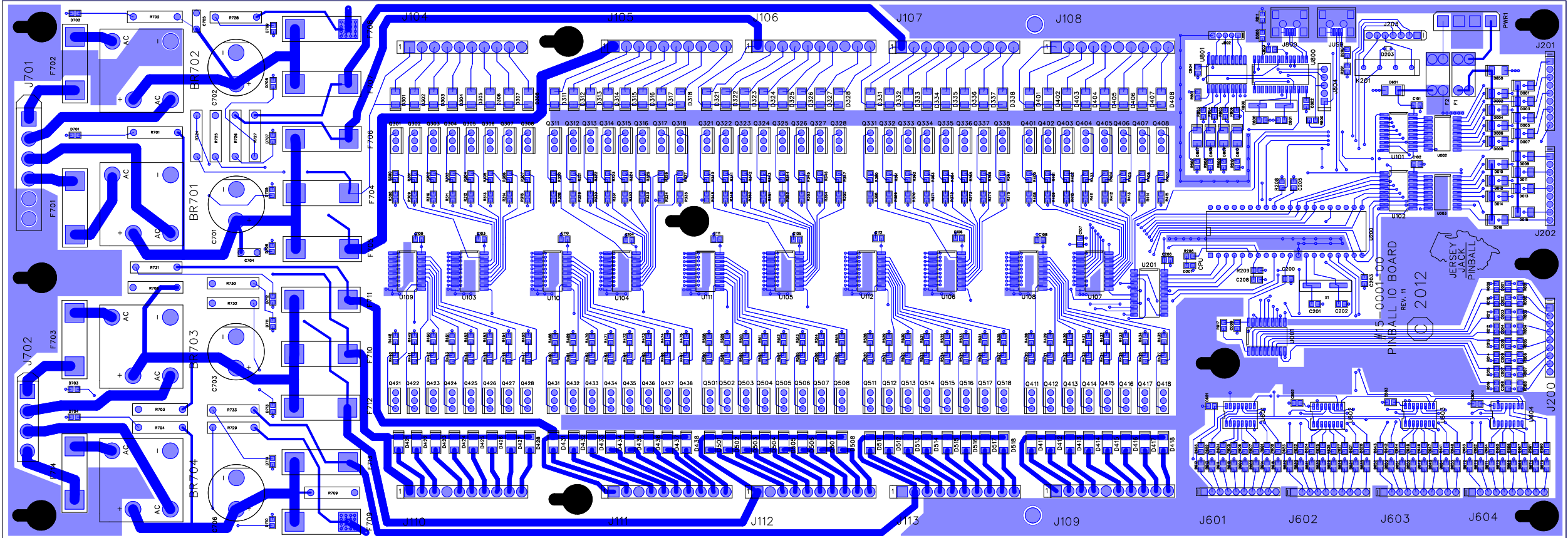
Connector Pin-outs, Revision C

J1 Sound Amplifier Board Connection

RJ45 cable to Sound Amplifier Board (inside Cabinet PCB Chassis), J5

J2 Headphone Output

3.5mm audio cable to external headphones



I/O PCB Assy, HOB
15-4001-01

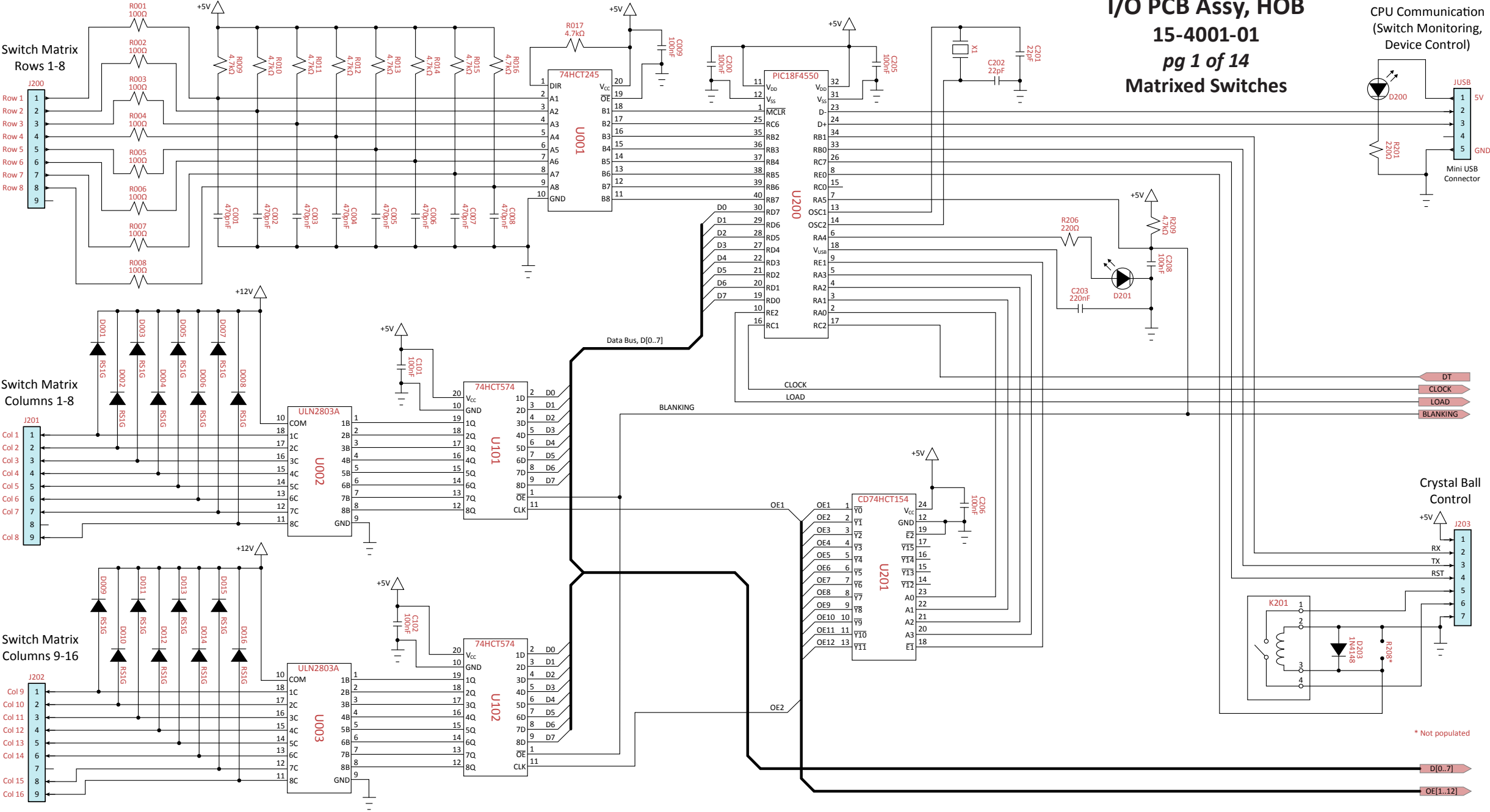
Component(s)	Part Number	Description
BARE PCB	15-0001-00	I/O Board
BR701-BR704	150-0001-0T	Bridge Rectifier, Wire Leads, 600V, 35A
C001-C008	100-471J-050	Capacitor, MLCC, 0805 SMT, 470pF, 50V, 5%
C009, C101-C112, C200, C205, C206, C208, C601-C604	100-104K-050	Capacitor, MLCC, 0805 SMT, 100nF, 50V, 10%
C201, C202	100-220J-050	Capacitor, MLCC, 0805 SMT, 22pF, 50V, 5%
C203, C802	100-224K-050	Capacitor, MLCC, 0805 SMT, 220nF, 50V, 10%
C701, C702	109-3K3M-100	Capacitor, Elect (Radial), 3300μF, 100V, 20%
C703, C706	109-15KM-035	Capacitor, Elect (Radial), 15000μF, 35V, 20%

Component(s)	Part Number	Description
C704-C705	101-104K-630	Capacitor, MLCC, Leaded, 100nF, 630V, 10%
C800-C804		Not Populated
D203	110-1000-0S	Diode, 1N4148, SMT, 75V, 300mA
D301-D308, D311-D318, D321-D328, D331-D338, D401-D408, D411-D418, D421-D428, D431-D438, D501-D508, D511-D518, D001-D016, D650, D651	110-5001-0S	Diode, RS1G, SMT, 400V, 1A, 150ns

Component(s)	Part Number	Description
D701-D714, D200, D203	24-0014-0S	LED, 0805 SMD, RED, 621nm
D806-D810		Not Populated
F701, F702	170-0110-SM	Fuse, Time Delay, 10A, 250V, 5mm x 20mm
F703, F706, F707	170-0163-SM	Fuse, Time Delay, 6.3A, 250V, 5mm x 20mm
F704, F708	170-0105-SM	Fuse, Time Delay, 5A, 250V, 5mm x 20mm
F705	170-0107-SM	Fuse, Time Delay, 7A, 250V, 5mm x 20mm
F710, F711, F712, F714	170-0104-SM	Fuse, Time Delay, 4A, 250V, 5mm x 20mm
F709	170-0103-SM	Fuse, Time Delay, 3A, 250V, 5mm x 20mm
F713	170-0102-SM	Fuse, Time Delay, 2A, 250V, 5mm x 20mm
F1, F2	170-3201-FB	Fuse, Fast-Acting, 1A, 32V, Mini Blade
F701-F714	22-8007-00	Fuse Holder, 5mm x 20mm, SMD, 250V, 10A
F1,F2	22-8006-00	Fuse Holder, Mini Blade, 500V, 20A
K201	160-0001-0T	Relay, Reed, SPST, Normally Open, 10W, 0.5A
Q301-Q308, Q311-Q318, Q321-Q328, Q331-Q338, Q401-Q408, Q411-Q418, Q421-Q428, Q431-Q438, Q501-Q508, Q511-Q518	130-0000-0T	MOSFET, IRL540, N-Ch, TO-220AB, 100V, 36A
R201, R206, R300-R307, R320-R327, R340-R347, R360-R367, R400-R407, R420-R427, R440-R447, R460-R467, R400, R500-R507, R520-R527, R600-R607, R620-R627, R640-R647, R660-R667	120-0220-254	Resistor, 0805 SMT, 220Ω, 0.25W, 5%
R209, R802, R009-R017 R308-R315, R328-R335, R348-R355, R368-R375, R408-R415, R428-R435, R448-R455, R468-R475, R508-R515, R528-R535 R608-R615, R628-R635, R648-R655, R668-R675	120-04K7-254	Resistor, 0805 SMT, 4.7kΩ, 0.25W, 5%
	120-001K-404	Resistor, 0805 SMT, 1kΩ, 0.4W, 5%
	120-010K-254	Resistor, 0805 SMT, 10kΩ, 0.25W, 5%

Component(s)	Part Number	Description
R701, R702, R724-R728	121-06K8-2H4	Resistor, Leaded, 6.8kΩ, 2W, 5%
R703, R730-R732	121-02K7-2H4	Resistor, Leaded, 2.7kΩ, 2W, 5%
R704, R729, R733	121-01K2-2H4	Resistor, Leaded, 1.2kΩ, 2W, 5%
R708, R709	121-0470-2H4	Resistor, Leaded, 470Ω, 2W, 5%
R001-R008	120-0100-254	Resistor, 0805 SMT, 100Ω, 0.25W, 5%
R208, R800, R801, R803-R811		Not Populated
U001	141-0008-0S	Octal Bus XCVRs w/3-State Outputs, 74HC245, SOIC-20 SMT
U002, U003	141-0009-0S	Darlington Transistor Array, ULN2803A, SOIC-18 SMT, NPN
U101-U112	141-0010-0S	Octal D-Type Flip-Flops w/3-State Outputs, 74HCT574, SOIC-20 SMT
U200	141-0011-0T	Microcontroller, 8-Bit, USB, 48MHz, PIC18F4550, PDIP-40
U200	31-3000-0T	DIP Socket, 40-pin, 2.54mm Pitch
U201	141-0012-0S	4- to 16-Line Decoder, CMOS, CD74HCT154, SOIC-24 SMT
U601-U604	141-0013-0S	Shift Register, Serial/Parallel to Serial, 8-Bit, 74HCT165, SOIC-16 SMT
U800, U801		Not Populated
X1	160-0002-0S	Crystal, 8MHz, ATS08ASM-1E, SMT, 20pF, 30PPM
X800		Not Populated
J104-J113	31-2505-10	Header, Male, 10-pin, 3.96mm
J200, J201, J202	31-2504-09	Header, Male, 9-pin, 2.54mm
J203	31-2501-07	Header, Male, 7-pin, Rt Angle, 2.54mm
J601-J604	31-2504-10	Header, Male, 10-pin, 2.54mm
J701	31-2506-06	Header, Male, 6-pin, .250" Centerline
J702	31-2506-04	Header, Male, 4-pin, .250" Centerline
JUSB	31-2507-00	Receptacle, Mini USB 2.0, Type B, SMT
J800, J802, J804		Not Populated
PWR1	31-2502-04	Connector Header, Male, 4-pin, Power

I/O PCB Assy, HOB
15-4001-01
pg 1 of 14
Matrixed Switches



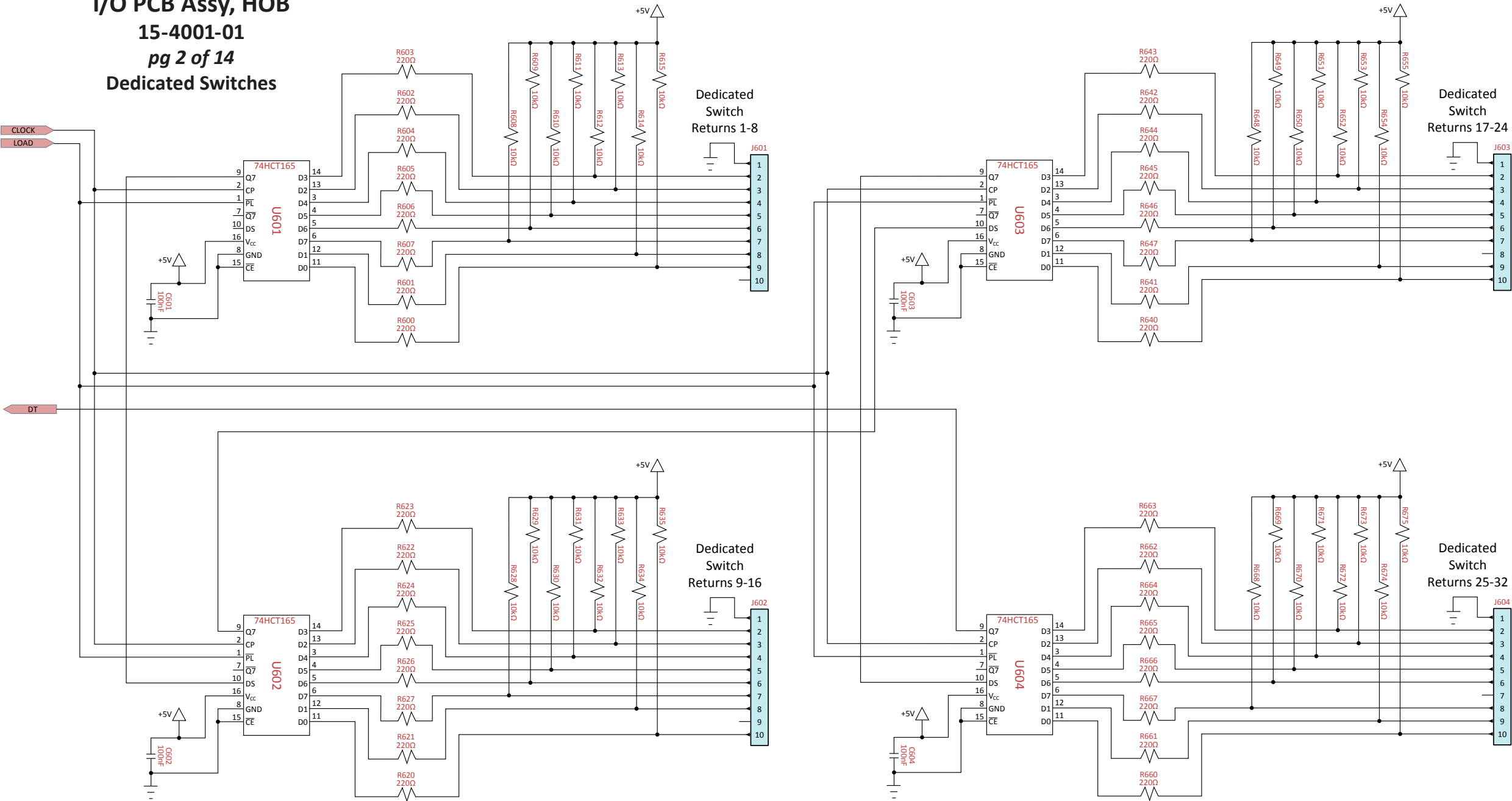
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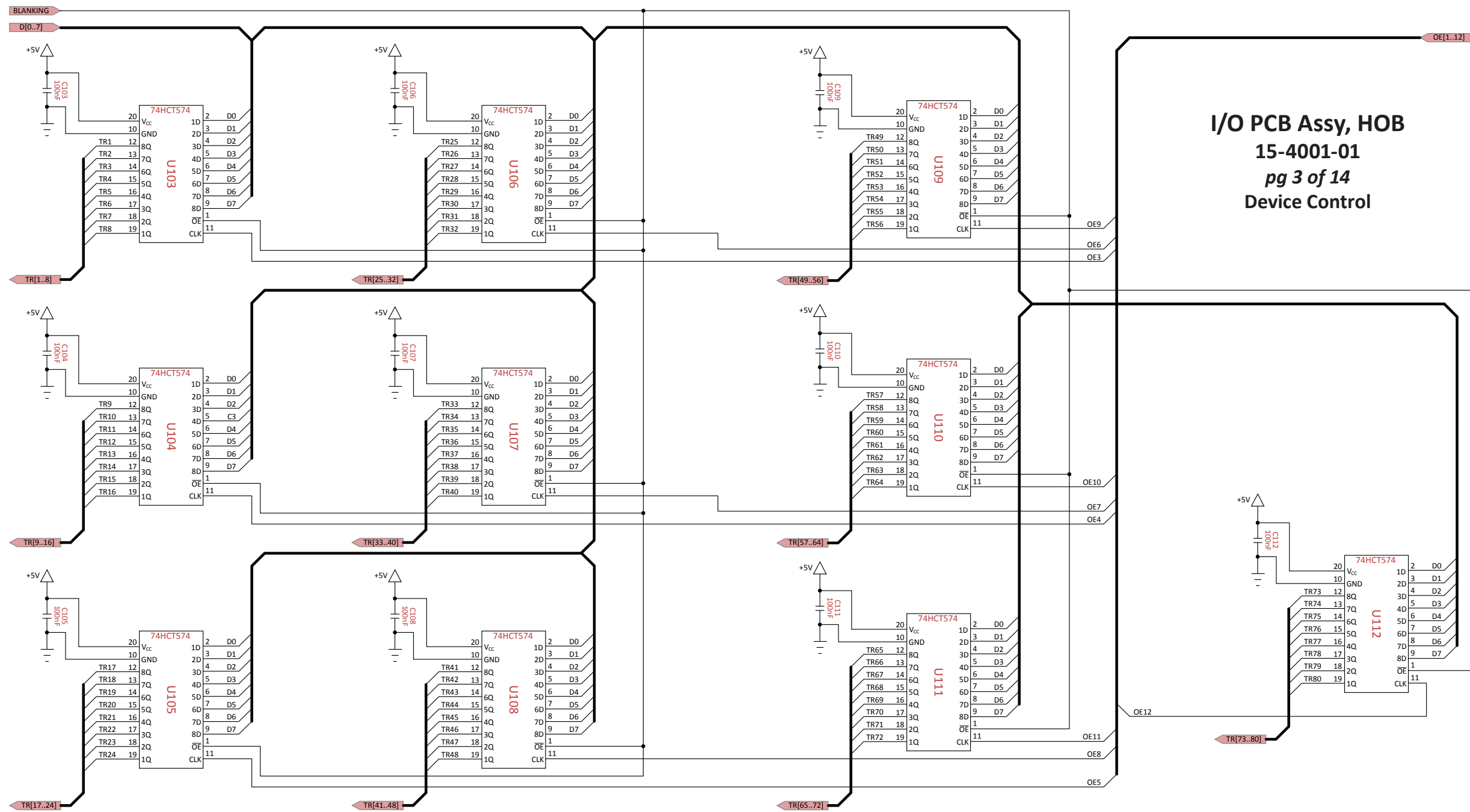
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15-4001-01

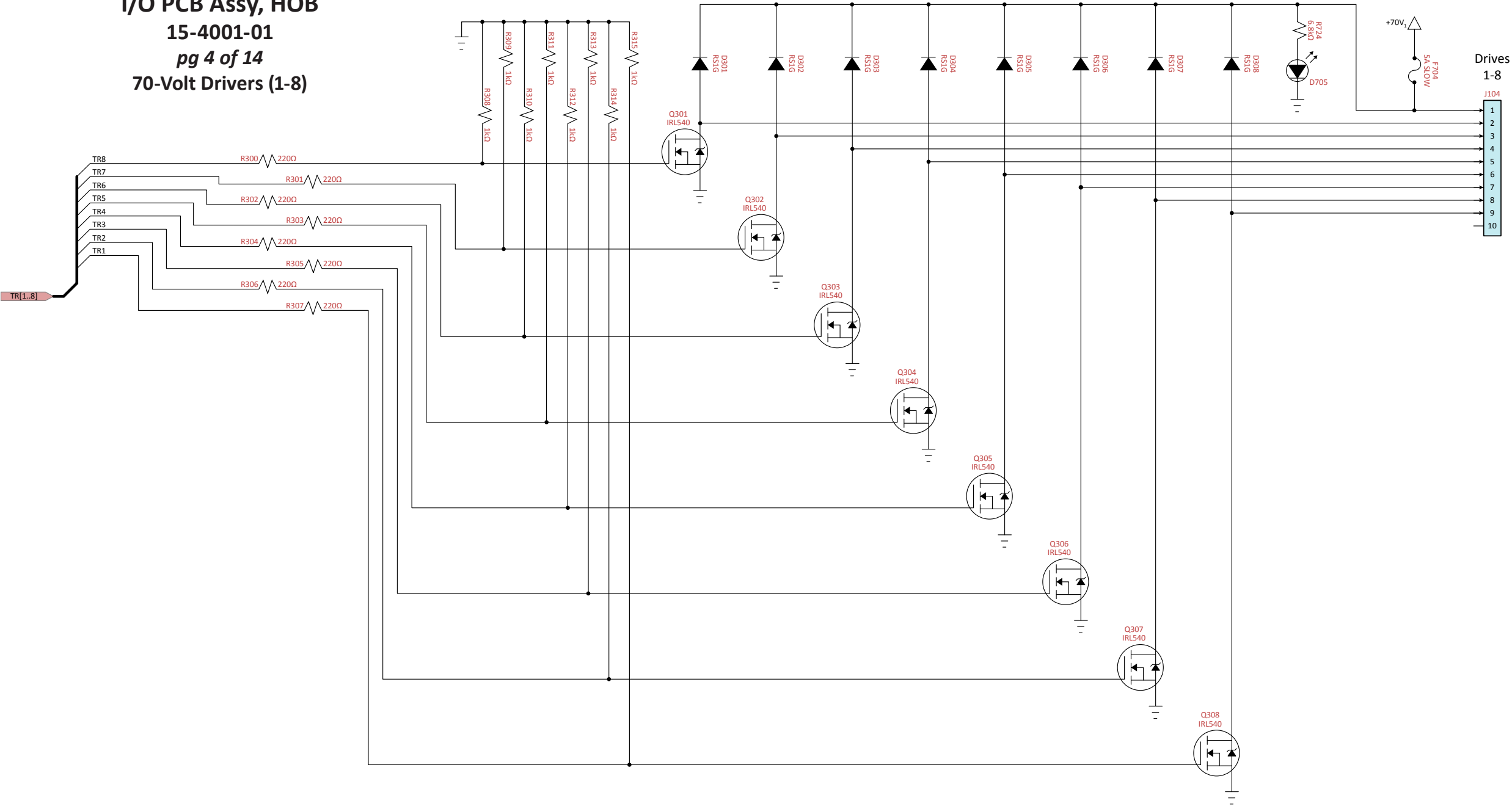
pg 2 of 14

Dedicated Switches

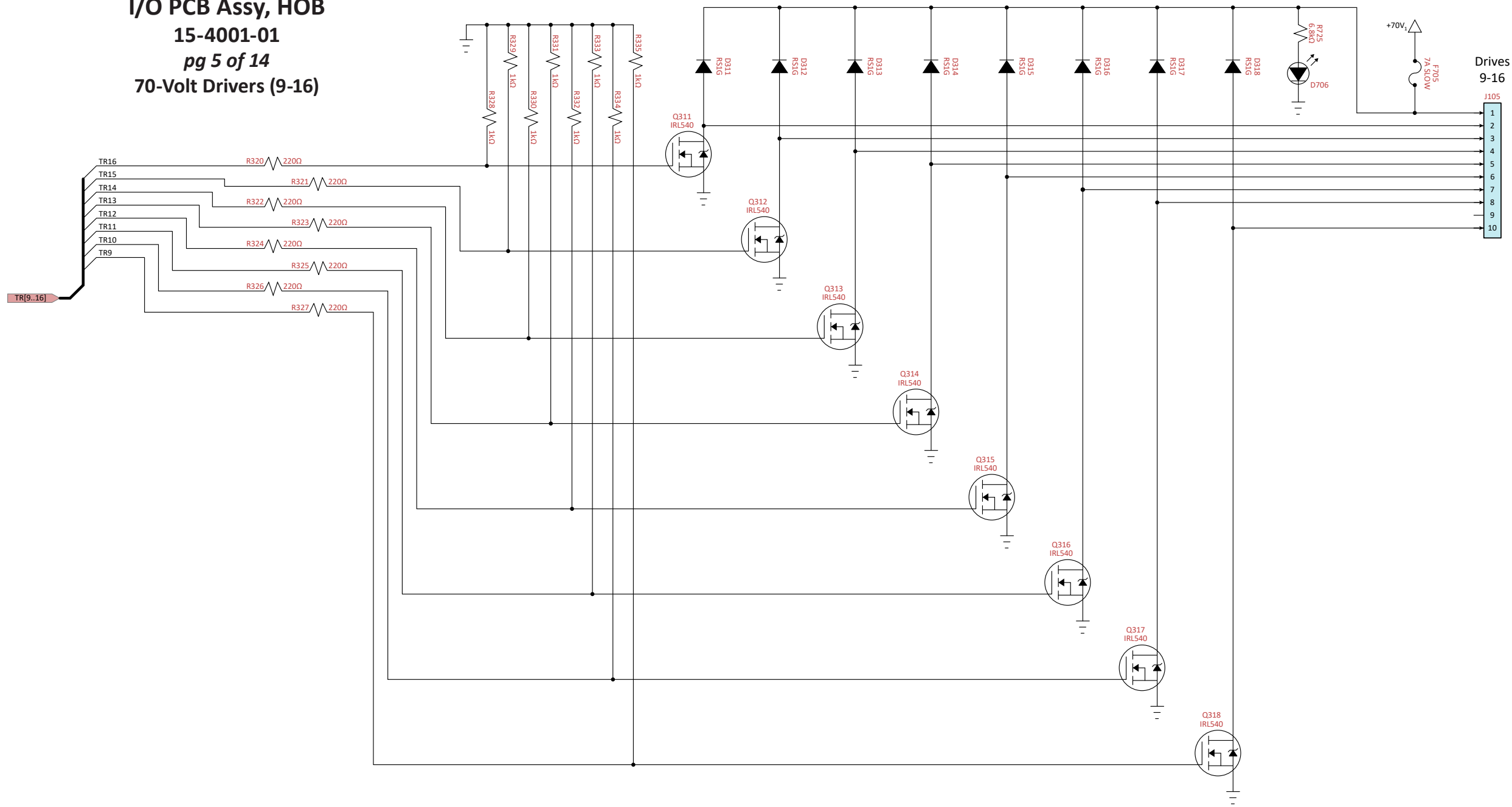




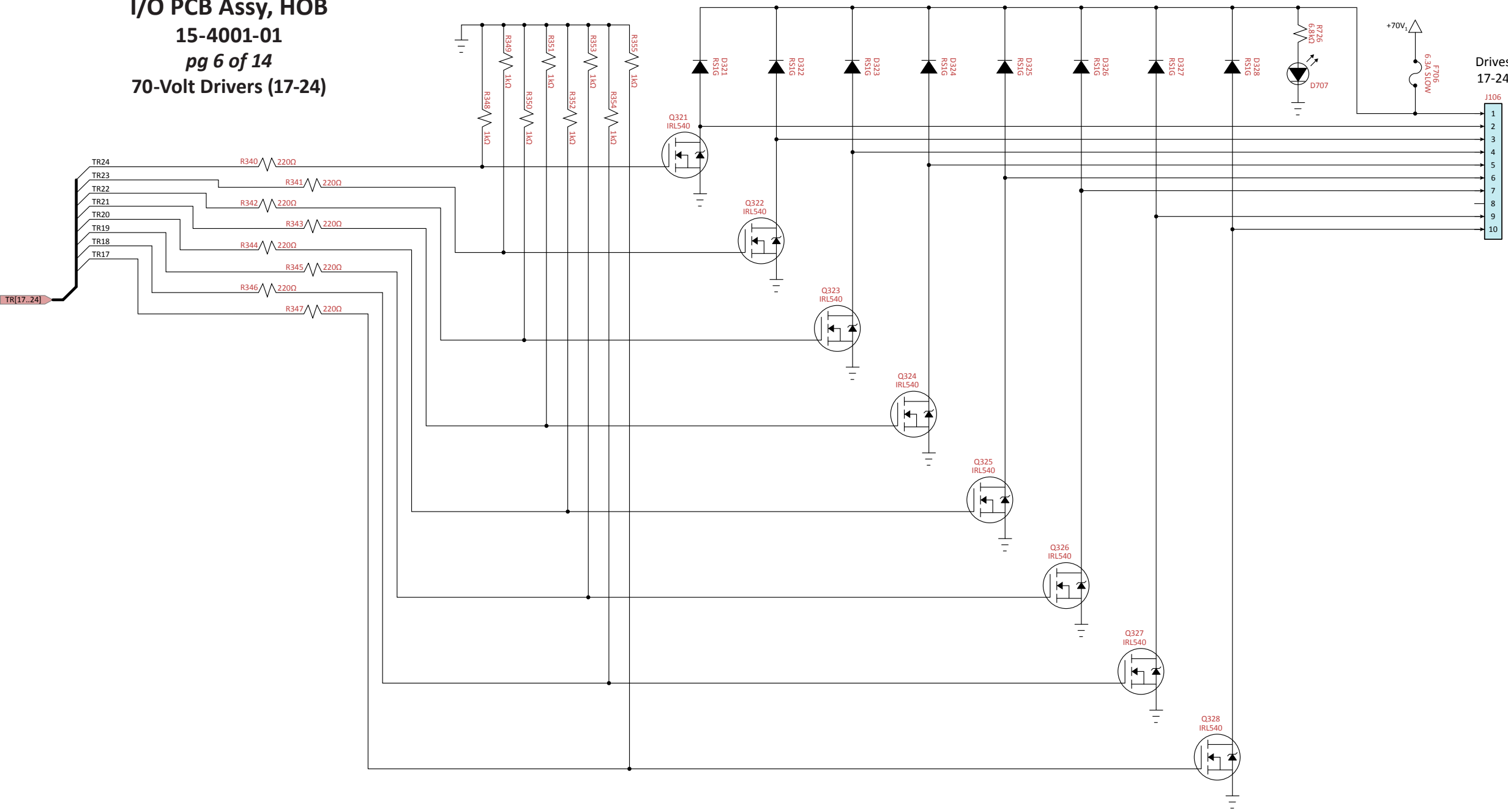
I/O PCB Assy, HOB
15-4001-01
pg 4 of 14
70-Volt Drivers (1-8)



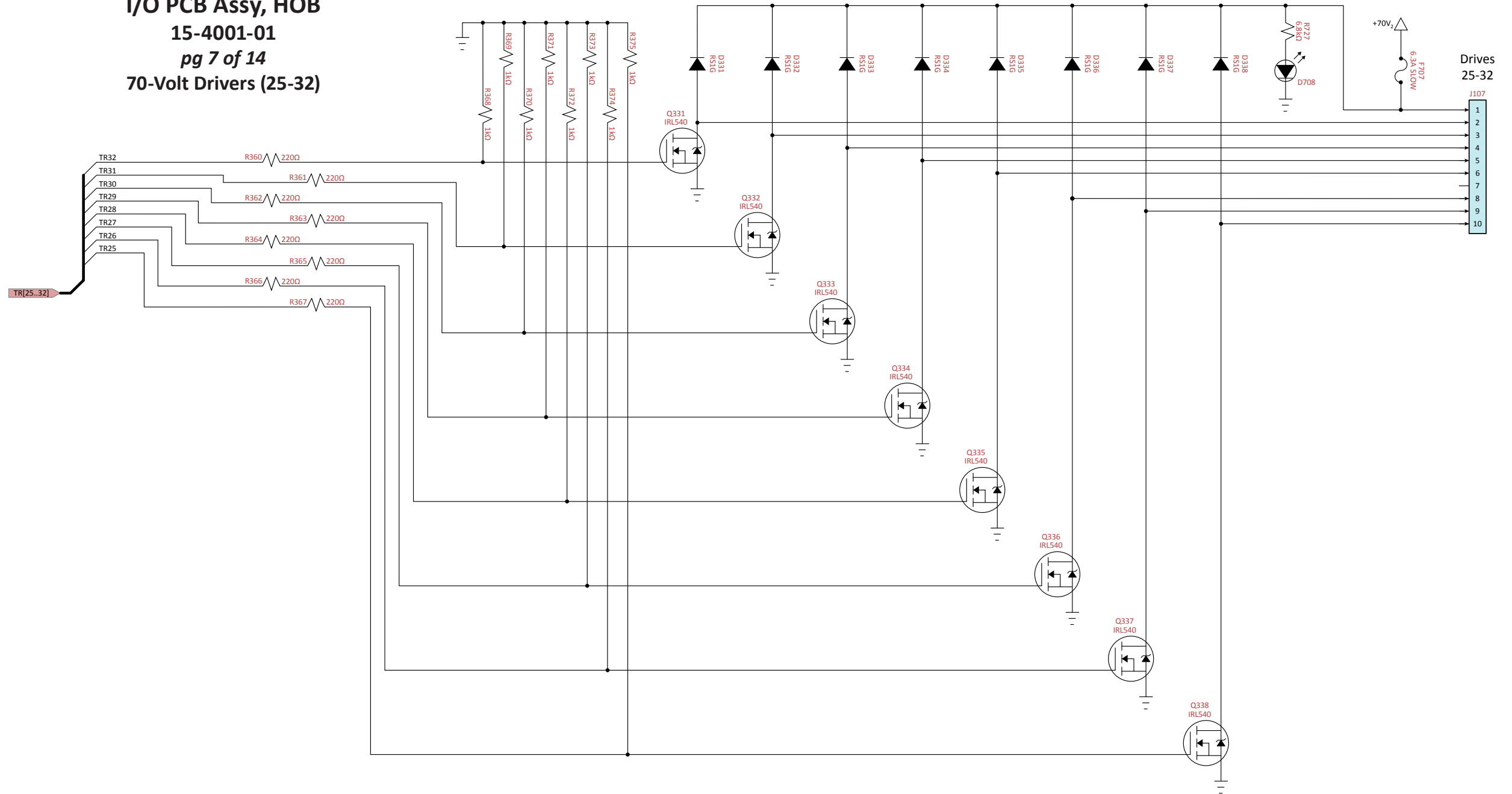
I/O PCB Assy, HOB
15-4001-01
pg 5 of 14
70-Volt Drivers (9-16)



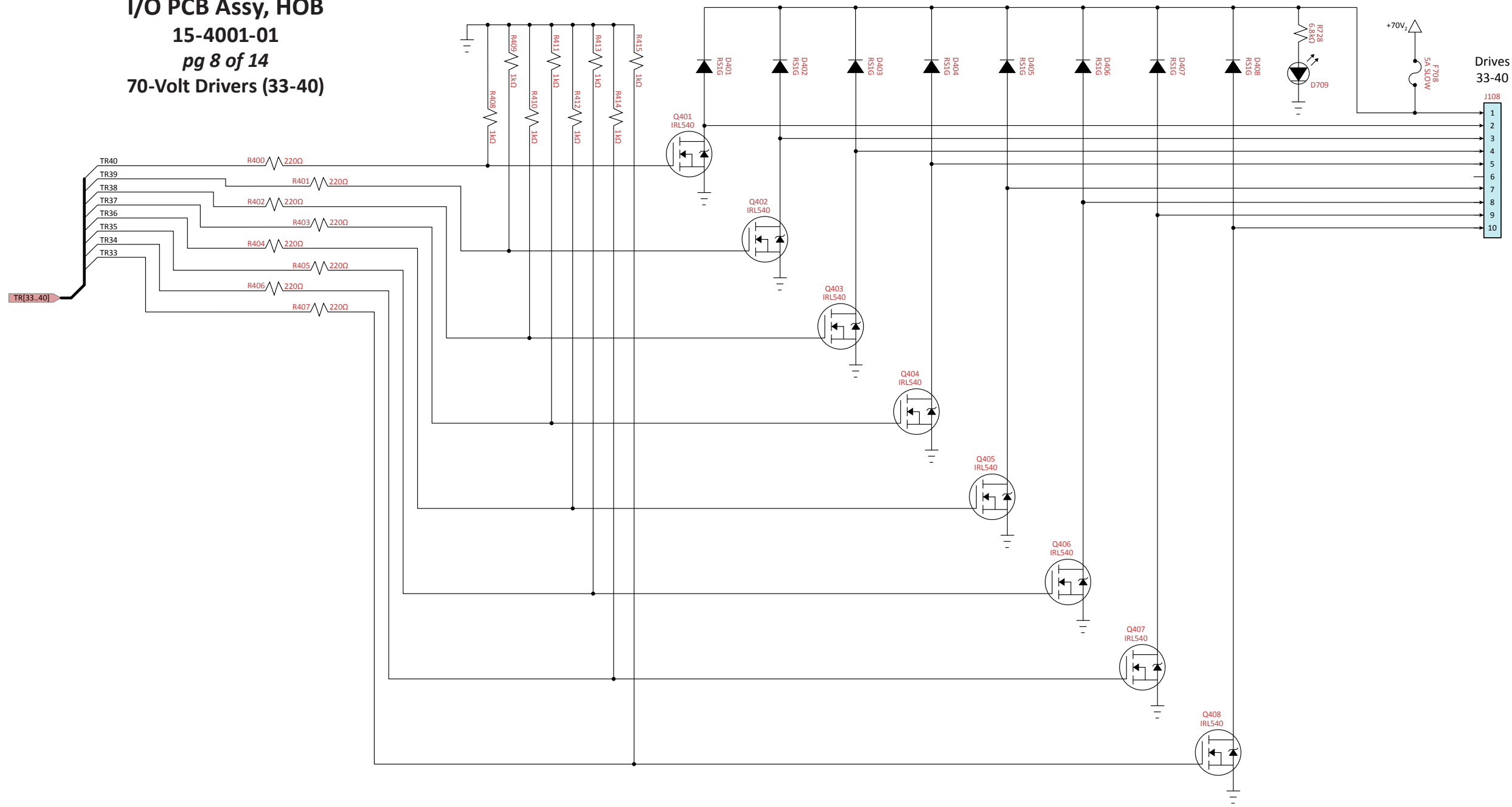
I/O PCB Assy, HOB
15-4001-01
pg 6 of 14
70-Volt Drivers (17-24)



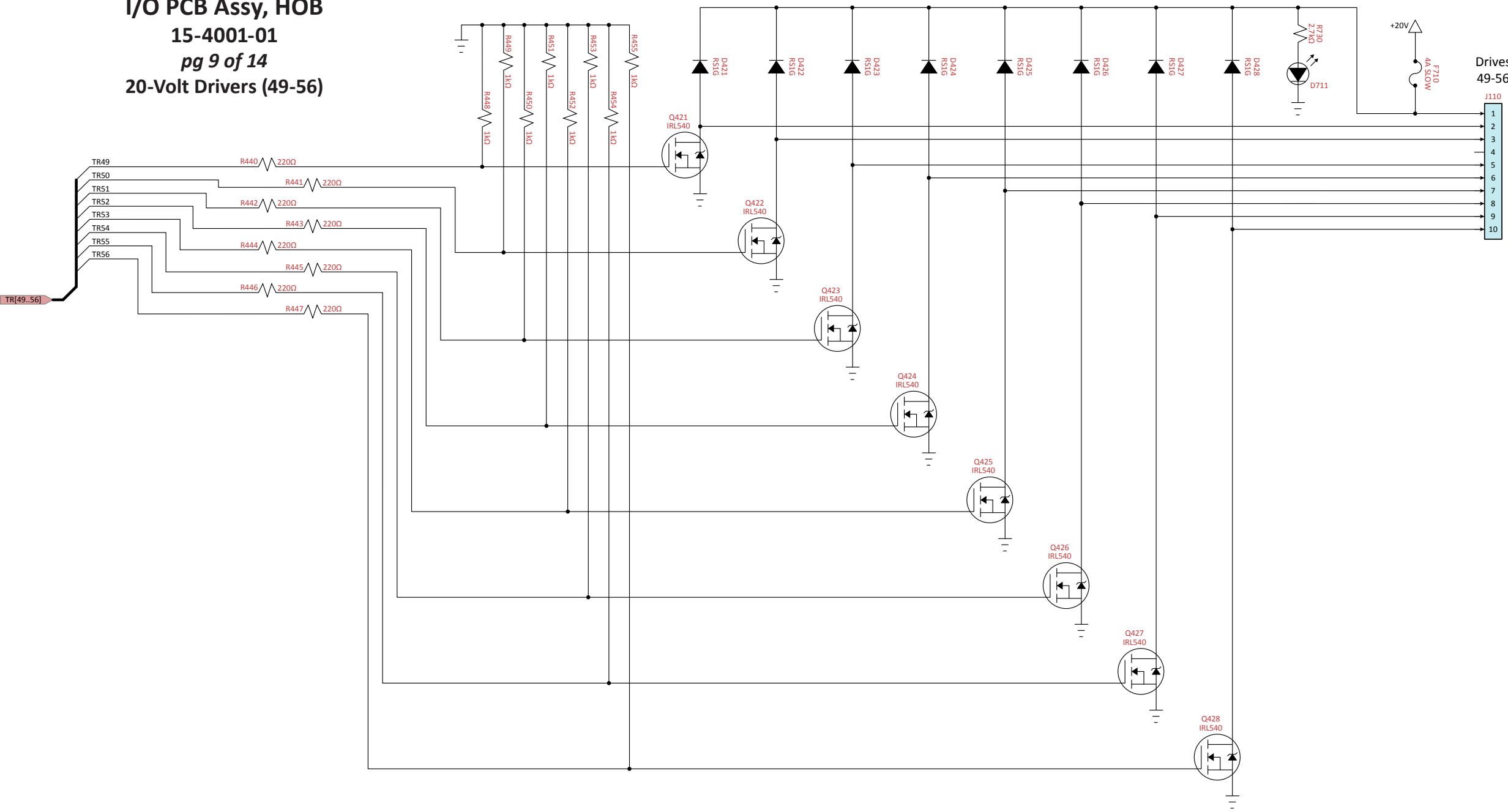
70-Volt Drivers (25-32)



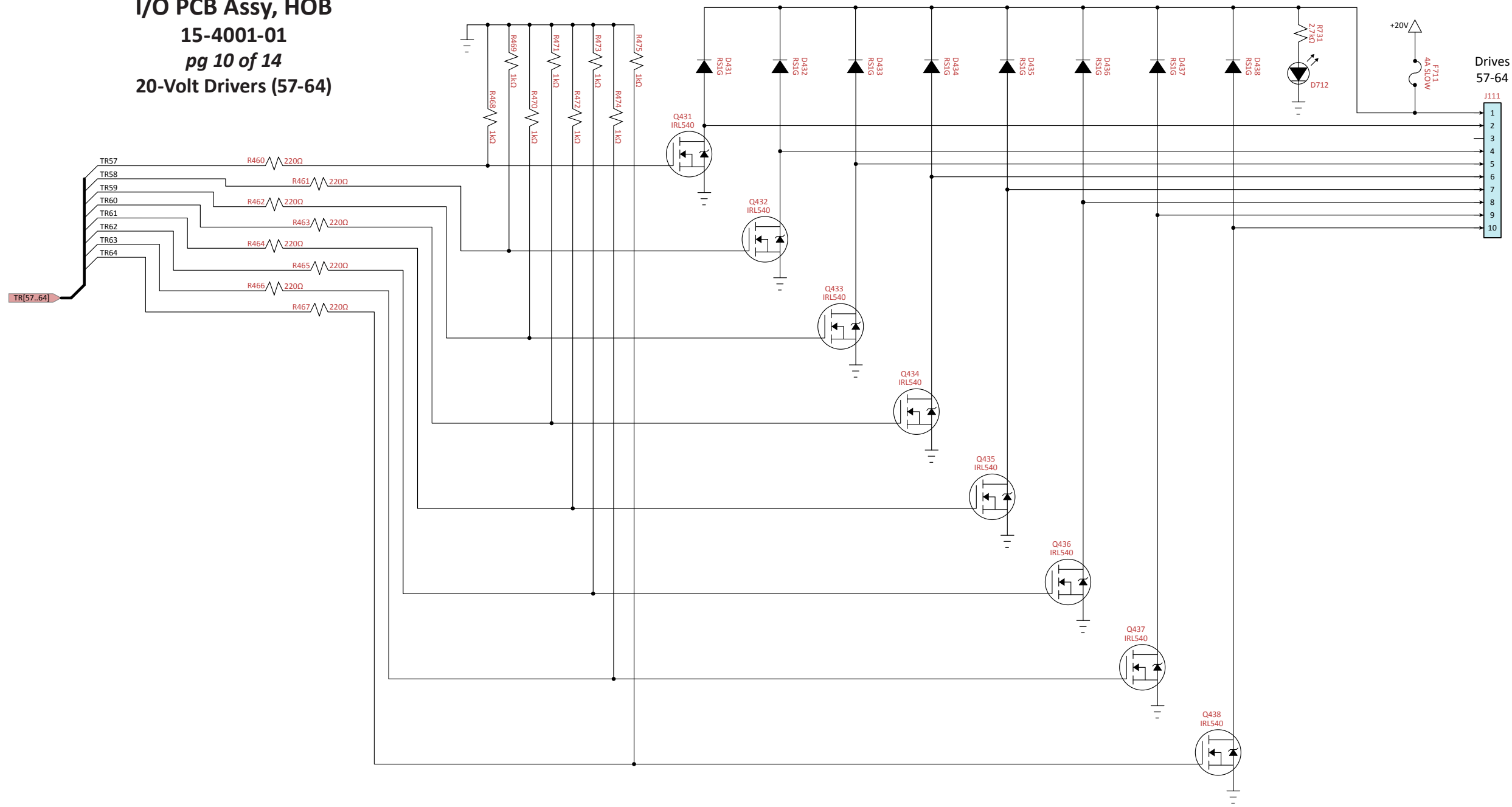
I/O PCB Assy, HOB
15-4001-01
pg 8 of 14
70-Volt Drivers (33-40)



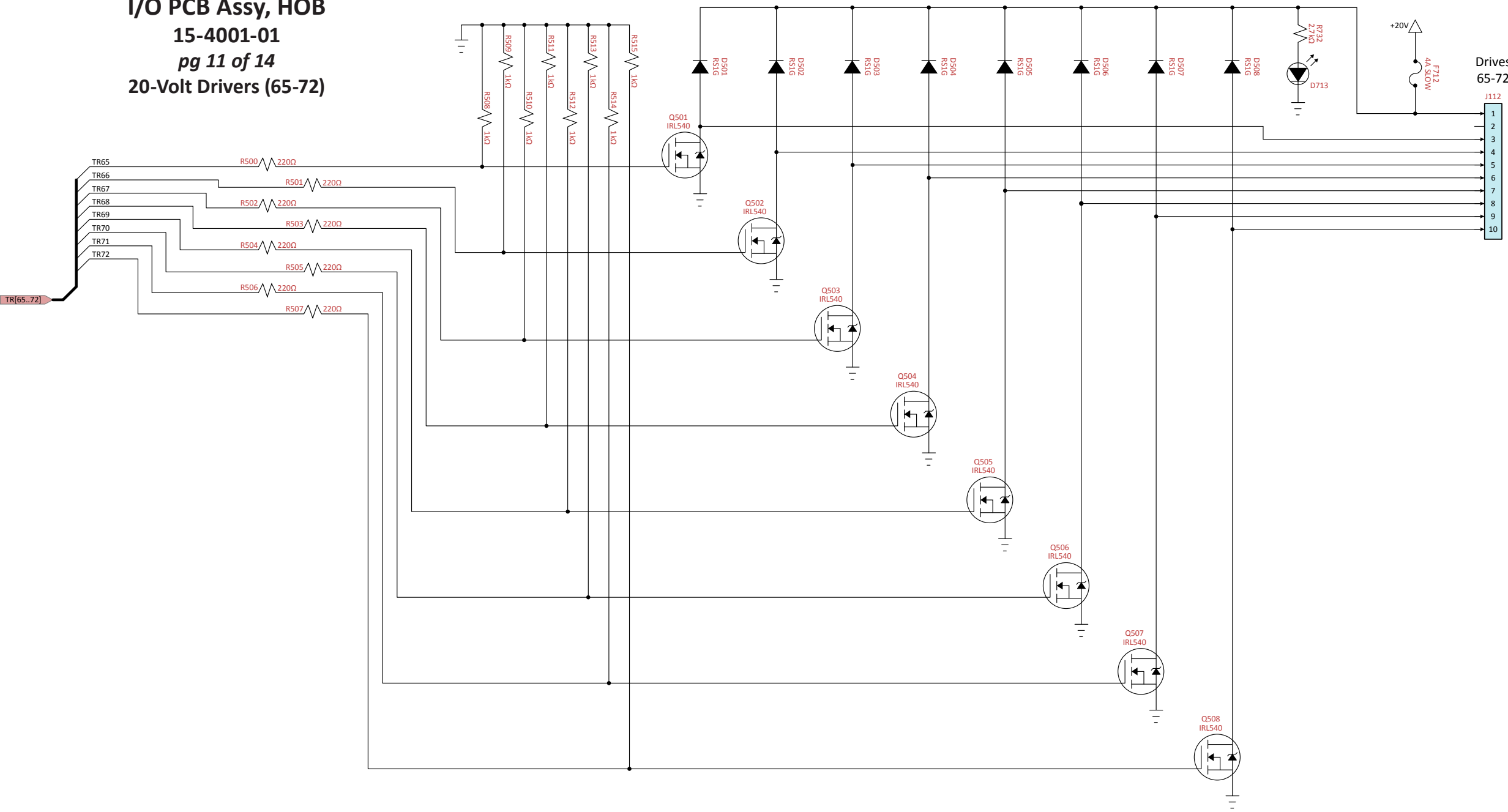
I/O PCB Assy, HOB
15-4001-01
pg 9 of 14
20-Volt Drivers (49-56)



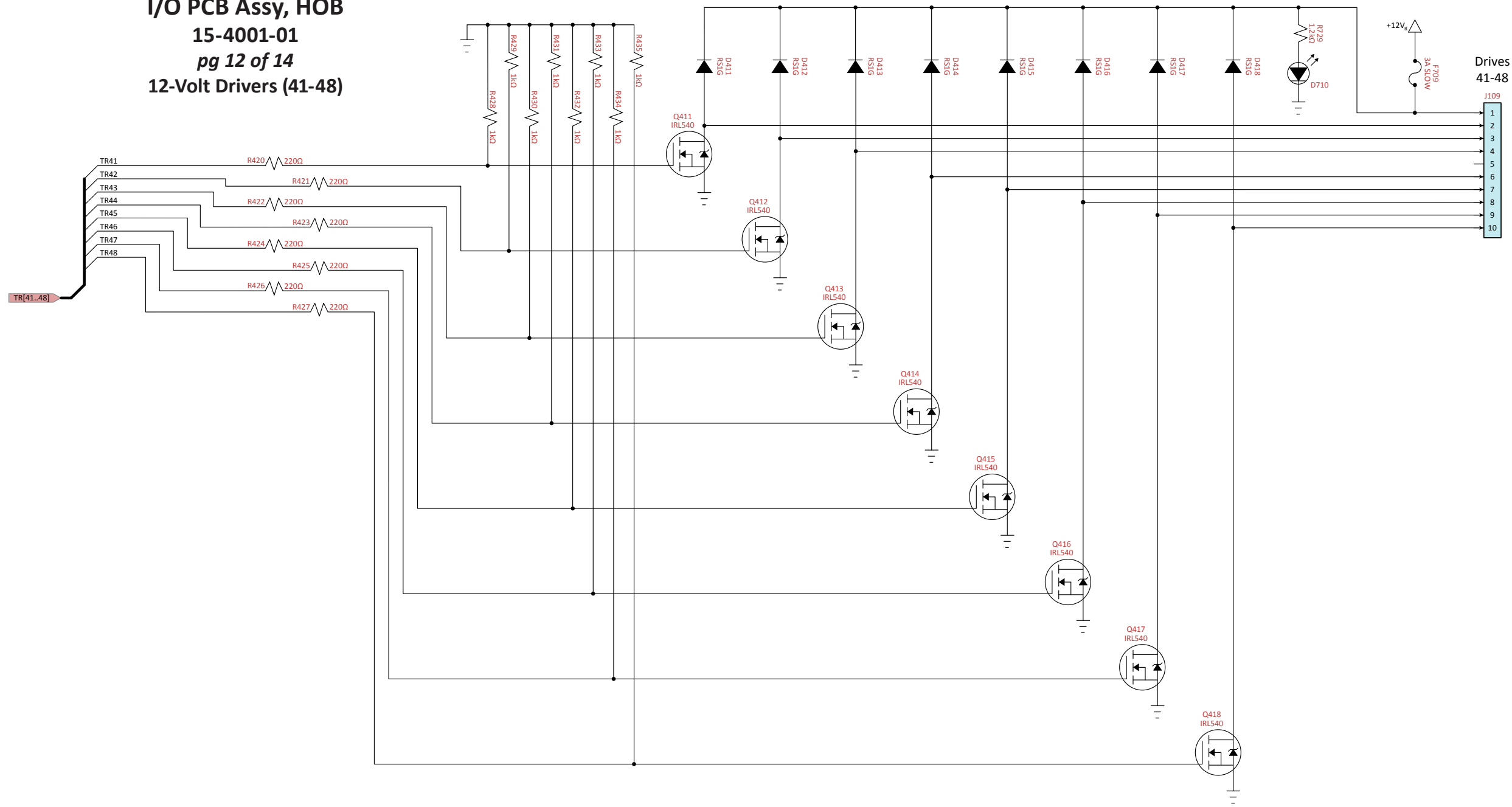
I/O PCB Assy, HOB
15-4001-01
pg 10 of 14
20-Volt Drivers (57-64)



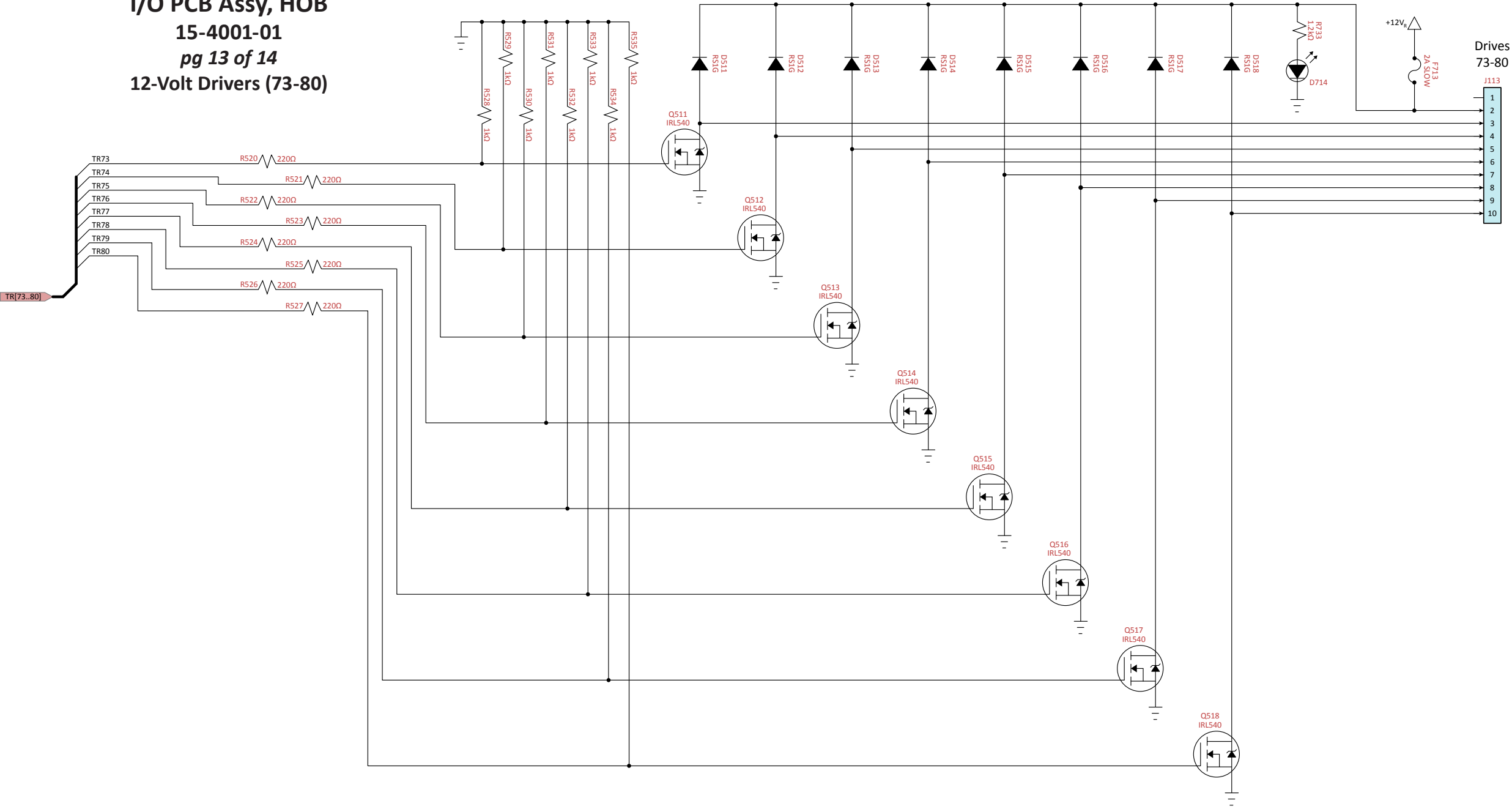
I/O PCB Assy, HOB
15-4001-01
pg 11 of 14
20-Volt Drivers (65-72)

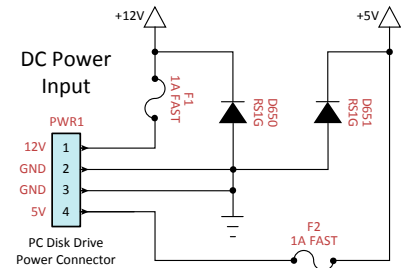


I/O PCB Assy, HOB
15-4001-01
pg 12 of 14
12-Volt Drivers (41-48)



I/O PCB Assy, HOB
15-4001-01
pg 13 of 14
12-Volt Drivers (73-80)



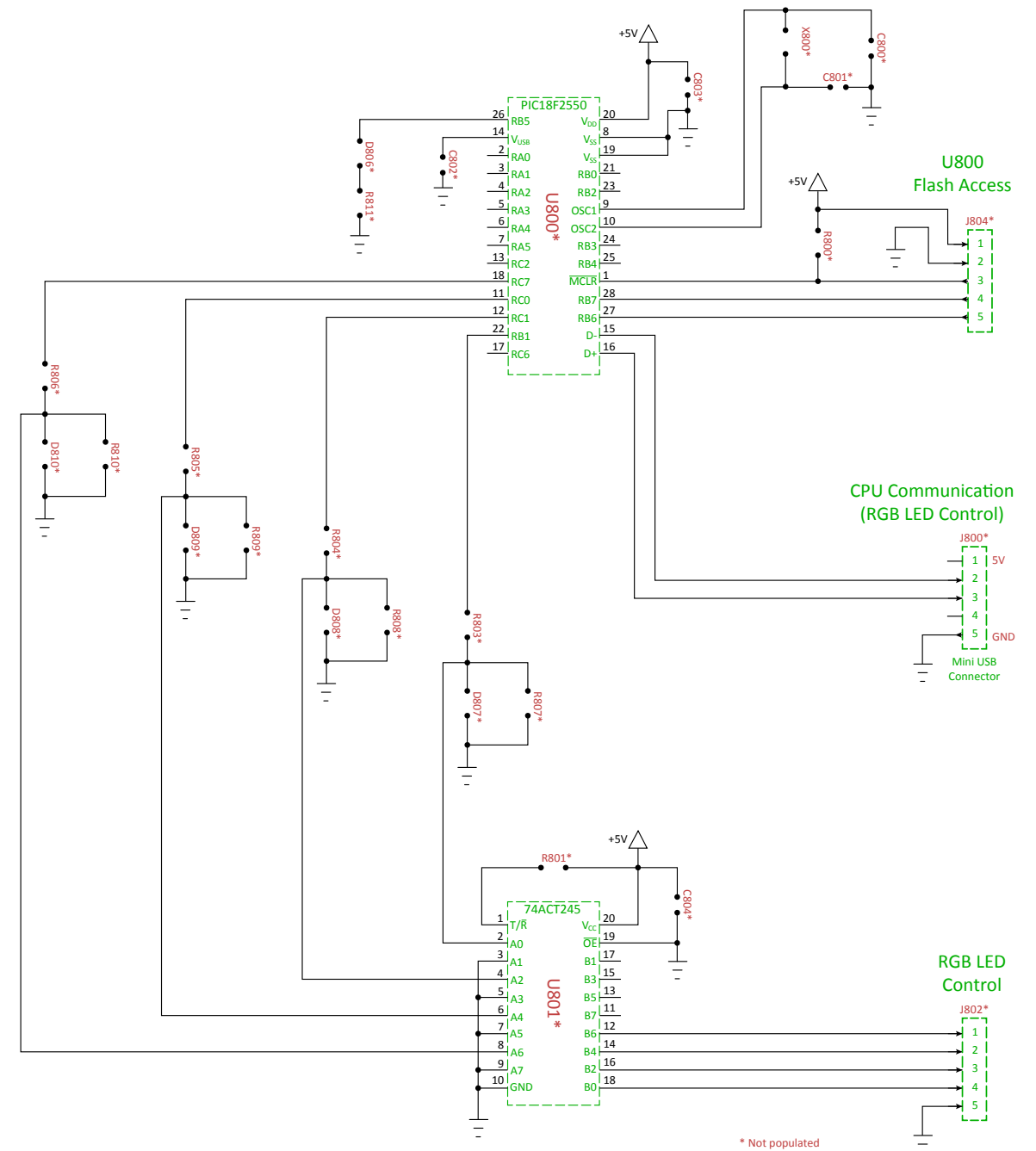
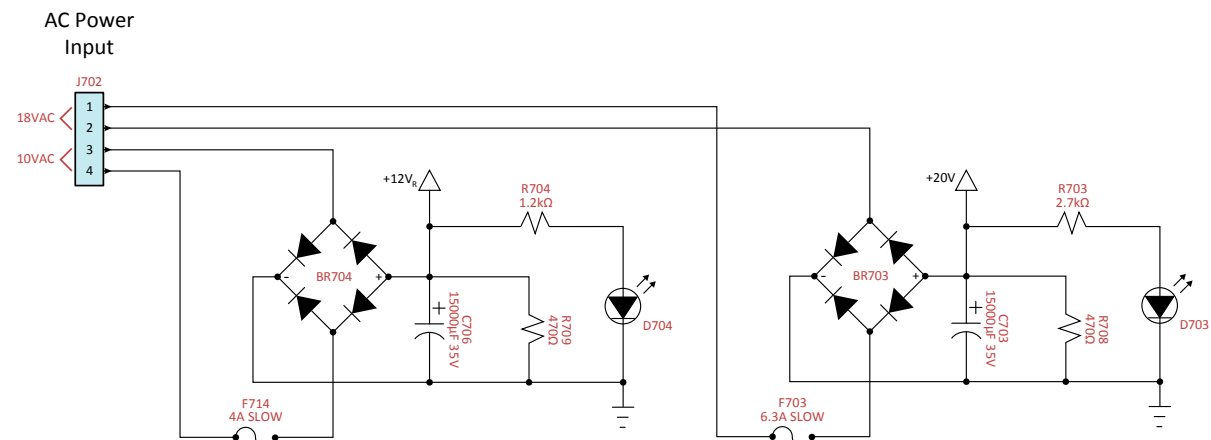
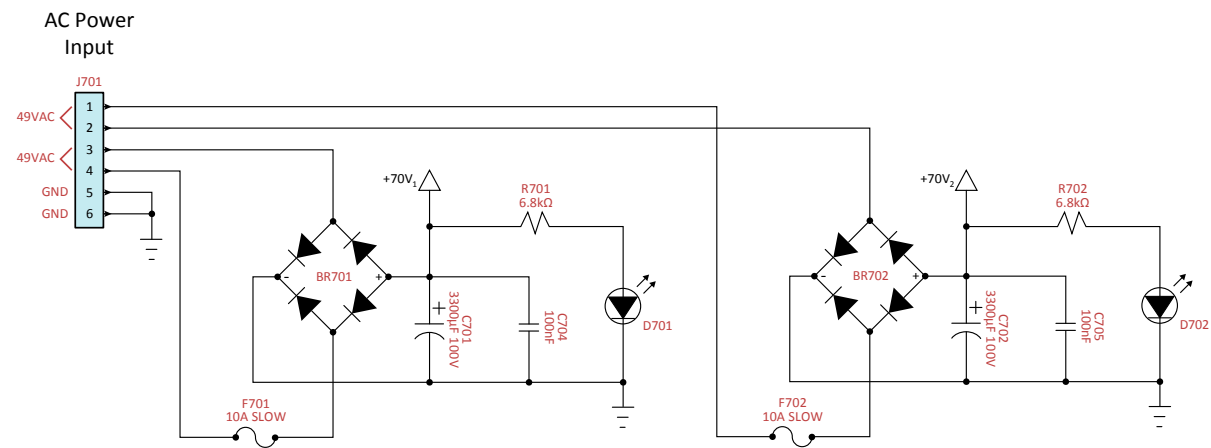


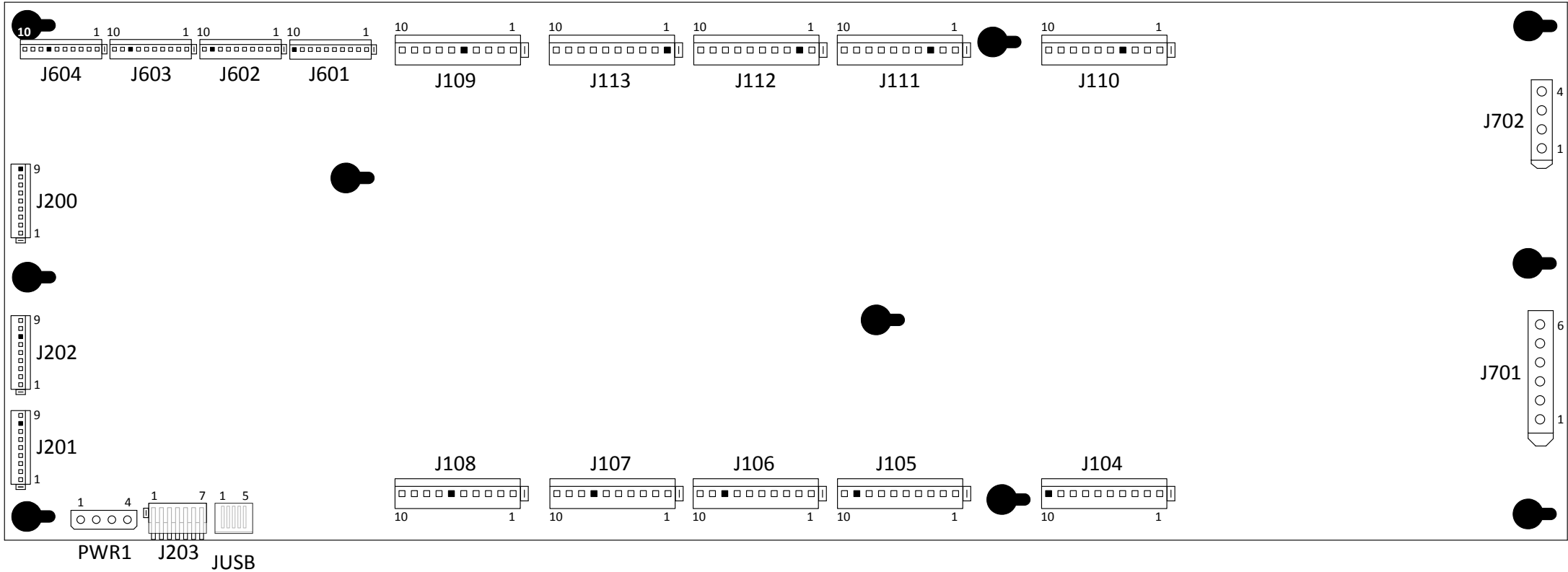
I/O PCB Assy, HOB

15-4001-01

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Power Input/Rectification





I/O PCB Assy, HOB
15-4001-01
Connector Pin-outs

J104 70-Volt Coil Drives (1-8)

J104-1	BRN	+70VDC supply to coils below
J104-2	BRN-VIO	Coil drive 8 [Ramp U-Turn Diverter]
J104-3	BRN-BLU	Coil drive 7 [Goblin Pop-Up Hold]
J104-4	BRN-GRN	Coil drive 6 [Goblin Pop-Up Power]
J104-5	BRN-YEL	Coil drive 5 [Right Flipper Hold]
J104-6	BRN-ORN	Coil drive 4 [Right Flipper Power]
J104-7	BRN-RED	Coil drive 3 [MAN Drop Target Reset]
J104-8	BRN-GRY	Coil drive 2 [MAN Drop Target Reset]
J104-9	BRN-BLK	Coil drive 1 [MAN Drop Target Reset]
J104-10	Key	

J105 70-Volt Coil Drives (9-16)

J105-1	RED	+70VDC supply to coils below
J105-2	RED-VIO	Coil drive 16 [Left Slingshot]
J105-3	RED-BLU	Coil drive 15 [Orc Pop-Up Hold]
J105-4	RED-GRN	Coil drive 14 [Orc Pop-Up Power]
J105-5	RED-YEL	Coil drive 13 [Left Flipper Hold]
J105-6	RED-ORN	Coil drive 12 [Left Flipper Power]
J105-7	RED-GRY	Coil drive 11 [ELF Drop Target Reset]
J105-8	RED-BRN	Coil drive 10 [ELF Drop Target Reset]
J105-9	Key	
J105-10	RED-BLK	Coil drive 9 [ELF Drop Target Reset]

J106 70-Volt Coil Drives (17-24)

J106-1	ORN	+70VDC supply to coils below
J106-2	ORN-VIO	Coil drive 24 [Right Slingshot]
J106-3	ORN-BLU	Coil drive 23 [Warg Pop-Up Hold]
J106-4	ORN-GRN	Coil drive 22 [Warg Pop-Up Power]
J106-5	ORN-YEL	Coil drive 21 [DWARF Drop Target Reset]
J106-6	ORN-GRY	Coil drive 20 [DWARF Drop Target Reset]
J106-7	ORN-RED	Coil drive 19 [DWARF Drop Target Reset]
J106-8	Key	
J106-9	ORN-BRN	Coil drive 18 [DWARF Drop Target Reset]
J106-10	ORN-BLK	Coil drive 17 [DWARF Drop Target Reset]

J107 70-Volt Coil Drives (25-32)

J107-1	TAN	+70VDC supply to coils/magnets below
J107-2	TAN-VIO	Coil drive 32 [Upper Slingshot]
J107-3	TAN-BLU	Coil drive 31 [Spider Pop-Up Hold]
J107-4	TAN-GRN	Coil drive 30 [Spider Pop-Up Power]
J107-5	TAN-YEL	Coil drive 29 [Ramp Hold Magnet]
J107-6	TAN-ORN	Coil drive 28 [Balin VUK]
J107-7	Key	
J107-8	TAN-RED	Coil drive 27 [Smaug Feed Diverter]
J107-9	TAN-BRN	Coil drive 26 [Upper Right Flipper Hold]
J107-10	TAN-BLK	Coil drive 25 [Upper Right Flipper Power]

J108 70-Volt Coil Drives (33-40)

J108-1	PNK	+70VDC supply to coils below
J108-2	PNK-VIO	Coil drive 40 [Knocker]
J108-3	PNK-BLU	Coil drive 39 [Windlance/Kickback]
J108-4	PNK-GRN	Coil drive 38 [5-Ball Trough VUK]
J108-5	PNK-YEL	Coil drive 37 [Ball Auto-Launch]
J108-6	Key	
J108-7	PNK-ORN	Coil drive 36 [Radagast VUK]
J108-8	PNK-RED	Coil drive 35 [Upper Pop Bumper]
J108-9	PNK-BRN	Coil drive 34 [Right Pop Bumper]
J108-10	PNK-BLK	Coil drive 33 [Left Pop Bumper]

J109 12-Volt Coil Drives (41-48)

J109-1	YEL	+12VDC supply to motors/lights below
J109-2	YEL-BLK	Coil drive 41 [Spotlights, Lower]
J109-3	YEL-BRN	Coil drive 42 [Shaker Motor]
J109-4	YEL-RED	Coil drive 43 [Smaug Stepper Motor 1]
J109-5	Key	
J109-6	YEL-ORN	Coil drive 44 [Smaug Stepper Motor 2]
J109-7	YEL-GRY	Coil drive 45 [Smaug Stepper Motor 3]
J109-8	YEL-GRN	Coil drive 46 [Smaug Stepper Motor 4]
J109-9	YEL-BLU	Coil drive 47 [Left Pop Bumper Light]
J109-10	YEL-VIO	Coil drive 48 [Spotlights, Upper]

J110 20-Volt Coil Drives (49-56)

J110-1	PLM	+20VDC supply to coils/magnets below
J110-2	PLM-BLK	Coil drive 49 [ELF Drop Target Retract]
J110-3	PLM-BRN	Coil drive 50 [ELF Drop Target Retract]
J110-4	Key	
J110-5	PLM-RED	Coil drive 51 [ELF Drop Target Retract]
J110-6	PLM-ORN	Not Used
J110-7	PLM-YEL	Coil drive 53 [Top Magnet, Left]
J110-8	PLM-GRN	Coil drive 54 [Top Magnet, Right]
J110-9	PLM-BLU	Not Used
J110-10	PLM-GRY	Not Used

J111 20-Volt Coil Drives (57-64)

J111-1	BLU	+20VDC supply to coils below
J111-2	BLU-BLK	Coil drive 57 [MAN Drop Target Retract]
J111-3	Key	
J111-4	BLU-BRN	Coil drive 58 [MAN Drop Target Retract]
J111-5	BLU-RED	Coil drive 59 [MAN Drop Target Retract]
J111-6	BLU-ORN	Coil drive 60 [Windlance Up Post]
J111-7	BLU-YEL	Coil drive 61 [Subway Diverter]
J111-8	BLU-GRN	Coil drive 62 [Windlance Diverter]
J111-9	BLU-GRY	Not Used
J111-10	BLU-VIO	Not Used

J112 20-Volt Coil Drives (65-72)

J112-1	VIO	+20VDC supply to coils below
J112-2	Key	
J112-3	VIO-BLK	Coil drive 65 [DWARF Drop Target Retract]
J112-4	VIO-BRN	Coil drive 66 [DWARF Drop Target Retract]
J112-5	VIO-RED	Coil drive 67 [DWARF Drop Target Retract]
J112-6	VIO-ORN	Coil drive 68 [DWARF Drop Target Retract]
J112-7	VIO-YEL	Coil drive 69 [DWARF Drop Target Retract]
J112-8	VIO-GRN	Not Used
J112-9	VIO-BLU	Not Used
J112-10	VIO-GRY	Not Used

J113 12-Volt Coil Drives (73-80)

J113-1	Key	
J113-2	LT BLU	+12VDC supply to light below
J113-3	LT BLU-BLK	Not Used
J113-4	LT BLU-BRN	Not Used
J113-5	LT BLU-RED	Not Used
J113-6	LT BLU-ORN	Not Used
J113-7	LT BLU-YEL	Not Used
J113-8	LT BLU-GRN	Not Used
J113-9	LT BLU-GRY	Coil drive 79 [Start Button Light]
J113-10	LT BLU-VIO	Coil drive 80 [Redemption Ticket Motor]

J200 Matrixed Switches, Rows

J200-1	WHT-BLK	Row 1 to playfield switches
J200-2	WHT-BRN	Row 2 to playfield switches
J200-3	WHT-RED	Row 3 to playfield switches
J200-4	WHT-ORN	Row 4 to playfield switches
J200-5	WHT-YEL	Row 5 to playfield switches
J200-6	WHT-GRN	Row 6 to playfield switches
J200-7	WHT-BLU	Row 7 to playfield switches
J200-8	WHT-VIO	Row 8 to playfield switches
J200-9	Key	

J201 Matrixed Switches, Columns (1-8)

J201-1	GRN-BLK	Column 1 to playfield switches
J201-2	GRN-BRN	Column 2 to playfield switches
J201-3	GRN-RED	Column 3 to playfield switches
J201-4	GRN-ORN	Column 4 to playfield switches
J201-5	GRN-YEL	Column 5 to playfield switches
J201-6	GRN-GRY	Column 6 to playfield switches
J201-7	GRN-BLU	Column 7 to playfield switches
J201-8	Key	
J201-9	GRN-VIO	Column 8 to playfield switches

J202 Matrixed Switches, Columns (9-16)

J202-1	GRY-BLK	Column 9 to playfield switches
J202-2	GRY-BRN	Column 10 to playfield switches
J202-3	GRY-RED	Column 11 to playfield switches
J202-4	GRY-ORN	Not Used
J202-5	GRY-YEL	Not Used
J202-6	GRY-GRN	Not Used
J202-7	Key	
J202-8	GRY-BLU	Not Used
J202-9	GRY-VIO	Not Used

J203 Serial Communications

J203-1	Not Used
J203-2	Not Used
J203-3	Not Used
J203-4	Not Used
J203-5	Not Used
J203-6	Not Used
J203-7	Not Used

J601 Dedicated Switches (1-8)

J601-1	BLK	Dedicated switch common (Ground)
J601-2	BLK-YEL	Not Used
J601-3	BLK-GRN	Not Used
J601-4	BLK-ORN	Not Used
J601-5	BLK-RED	Dedicated switch return 3 [Upper Right Flipper EOS]
J601-6	BLK-BRN	Dedicated switch return 2 [Right Flipper EOS]
J601-7	BLK-GRY	Dedicated switch return 1 [Left Flipper EOS]
J601-8	Not Used	
J601-9	Not Used	
J601-10	Key	

J602 Dedicated Switches (9-16)

J602-1	BLK	Dedicated switch common (Ground)
J602-2	YEL-GRY	Dedicated switch return 13 [Enter/Menu Button]
J602-3	YEL-GRN	Dedicated switch return 14 [Up/Volume+ Button]
J602-4	YEL-ORN	Dedicated switch return 12 [Right Flipper Switch, Upper]
J602-5	YEL-RED	Dedicated switch return 11 [Right Flipper Switch, Lower]
J602-6	YEL-BRN	Not Used
J602-7	YEL-BLK	Dedicated switch return 9 [Left Flipper Switch]
J602-8	YEL-BLU	Dedicated switch return 15 [Down/Volume- Button]
J602-9	Key	
J602-10	YEL-VIO	Dedicated switch return 16 [Escape/Service Credit Button]

J603 Dedicated Switches (17-24)

J603-1	BLK	Dedicated switch common (Ground)
J603-2	BLU-YEL	Dedicated switch return 21 [5th Coin Slot Switch]
J603-3	BLU-GRN	Dedicated switch return 22 [Ticket Mech Notch Switch]
J603-4	BLU-ORN	Dedicated switch return 20 [4th Coin Slot Switch]
J603-5	BLU-RED	Dedicated switch return 19 [Center Dollar Bill Acceptor]
J603-6	BLU-BRN	Dedicated switch return 18 [Right Coin Switch]
J603-7	BLU-BLK	Dedicated switch return 17 [Left Coin Switch]
J603-8	Key	
J603-9	BLU-GRY	Not Used
J603-10	BLU-VIO	Not Used

J604 Dedicated Switches (25-32)

J604-1	BLK	Dedicated switch common (Ground)
J604-2	VIO-YEL	Not Used
J604-3	VIO-GRN	Not Used
J604-4	VIO-ORN	Not Used
J604-5	VIO-RED	Dedicated switch return 27 [Ring Button]
J604-6	VIO-BRN	Dedicated switch return 26 [Coin Door Open]
J604-7	Key	
J604-8	VIO-BLK	Dedicated switch return 25 [Start Button]
J604-9	VIO-BLU	Not Used
J604-10	VIO-GRY	Not Used

J701 AC Power Input (High)

J701-1	RED	49VAC from transformer (across RED lines)
J701-2	RED	49VAC from transformer (across RED lines)
J701-3	BLU	49VAC from transformer (across BLU lines)
J701-4	BLU	49VAC from transformer (across BLU lines)
J701-5	GRN	Chassis Ground
J701-6	GRN	Chassis Ground

J702 AC Power Input (Low)

J702-1	YEL	18VAC from transformer (across YEL lines)
J702-2	YEL	18VAC from transformer (across YEL lines)
J702-3	GRY	10VAC from transformer (across GRY lines)
J702-4	GRY	10VAC from transformer (across GRY lines)

J800 CPU Communication

Not Used (Not Populated)

J802 RGB LED Control

Not Used (Not Populated)

J804 Flash Programming Access

Not Used (Not Populated)

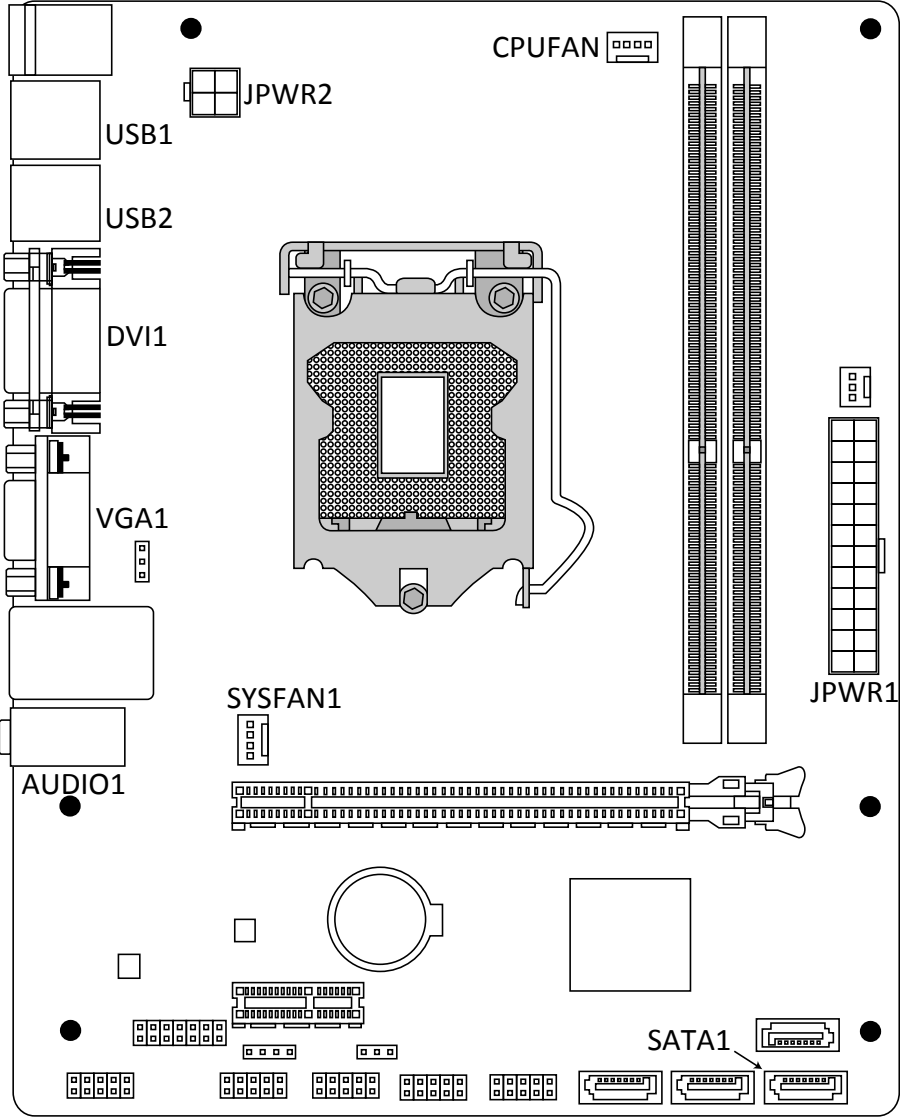
JUSB CPU Communication (Switch Monitoring/Device Control)

Mini USB cable to CPU Board USB connector

PWR1 DC Power Input

PWR1-1	YEL	+12VDC from Primary ATX Pwr Supply
PWR1-2	BLK	Ground from Primary ATX Pwr Supply
PWR1-3	BLK	Ground from Primary ATX Pwr Supply
PWR1-4	RED	+5VDC from Primary ATX Pwr Supply

Note: All I/O Board connections to J104-J113, J200-J202, J601-J603, J701 & J702 pass through in-line connectors mounted in back panel of Cabinet PCB Chassis Assembly.



CPU Board, 15-0000-01
Connector Pin-outs

JPWR2 DC Power Input

JPWR2-1	BLK	Ground from Primary ATX Pwr Supply
JPWR2-2	BLK	Ground jumpered from pin 1
JPWR2-3	YEL-BLK	+12VDC from Primary ATX Pwr Supply
JPWR2-4	YEL-BLK	+12VDC jumpered from pin 3

CPUFAN CPU Fan Power

Primary connection for CPU fan (on CPU Board)

JPWR1 DC Power Input

JPWR1-1	ORN	+3.3VDC from Primary ATX Pwr Supply
JPWR1-2	ORN	+3.3VDC from Primary ATX Pwr Supply
JPWR1-3	BLK	Ground from Primary ATX Pwr Supply
JPWR1-4	RED	+5VDC from Primary ATX Pwr Supply
JPWR1-5	BLK	Ground from Primary ATX Pwr Supply
JPWR1-6	RED	+5VDC from Primary ATX Pwr Supply
JPWR1-7	BLK	Ground from Primary ATX Pwr Supply
JPWR1-8	GRY	Power OK signal from Primary ATX Pwr Supply
JPWR1-9	VIO	+5VDC Standby from Primary ATX Pwr Supply
JPWR1-10	YEL	+12VDC from Primary ATX Pwr Supply
JPWR1-11	ORN	+3.3VDC from Primary ATX Pwr Supply
JPWR1-12	BLU	-12VDC from Primary ATX Pwr Supply
JPWR1-13	BLK	Ground from Primary ATX Pwr Supply
JPWR1-14	GRN	Power Supply ON signal from Primary ATX Pwr Supply
JPWR1-15	BLK	Ground from Primary ATX Pwr Supply
JPWR1-16	BLK	Ground from Primary ATX Pwr Supply
JPWR1-17	BLK	Ground from Primary ATX Pwr Supply
JPWR1-18	Not Used	
JPWR1-19	RED	+5VDC from Primary ATX Pwr Supply
JPWR1-20	RED	+5VDC from Primary ATX Pwr Supply

SATA1 SATA Data Input/Output

SATA cable to solid state hard drive (inside Cabinet PCB Chassis)

SYSFAN1 System Fan Power

Secondary connection for CPU fan (on CPU Board)

AUDIO1 Audio Output

3.5mm audio cable to Sound Amplifier Board, J2

VGA1 Video Output

VGA cable to Book LCD monitor

DVI1 Video Output

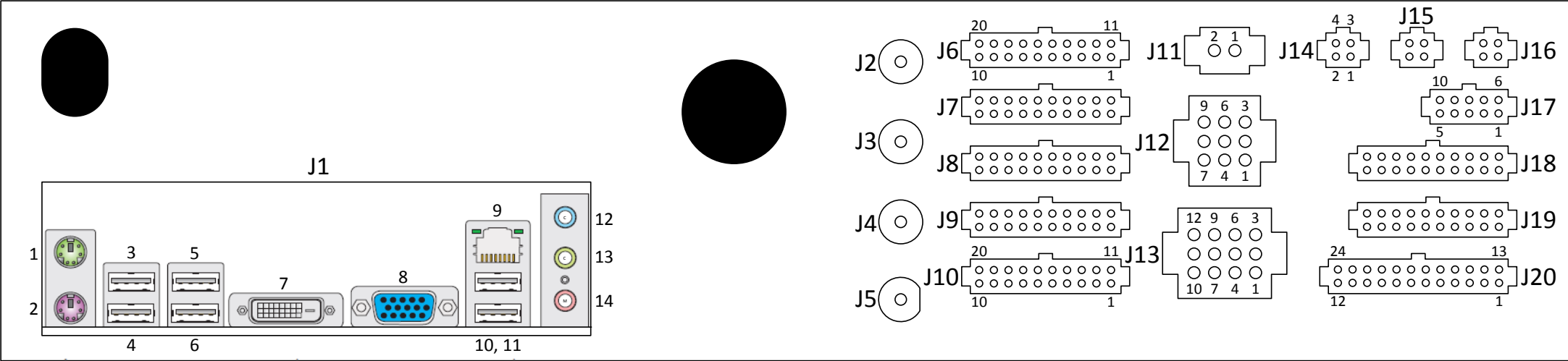
DVI cable to LCD monitor (in backbox)

USB1 USB 2.0 Ports (2)

Mini USB cable to I/O Board, JUSB
USB extension cable to front of cabinet (inside coin door)

USB2 USB 3.0 Ports (2)

Hobbit Game Security Dongle
Mini USB cable to BAG Controller Board, J101



Rear Panel of Cabinet PCB Chassis Assy, HOB, 15-5000-02
Pass-through Connector Pin-outs

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis	Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
J1 CPU Board Connections				J2 Subwoofer Speaker			
CPU PS-2 Mouse Input	J1-1	N/A	Not Used	Sound Amplifier Bd, J8	J2	BLK-RED	RCA cable to cabinet subwoofer speaker
CPU PS-2 Keyboard Input	J1-2	N/A	Not Used	J3 Backbox Speaker Bar, Left			
CPU USB 2.0 Port	J1-3	N/A	USB to mini USB cable to BAG Controller Bd, J101	Sound Amplifier Bd, J6	J3	WHT	RCA cable to Backbox Speaker Bar (left side RCA jack)
CPU USB 2.0 Port	J1-4	N/A	USB extension cable to front of cabinet (inside coin door)	J4 Backbox Speaker Bar, Right			
CPU USB 2.0 Port	J1-5	N/A	Not Used	Sound Amplifier Bd, J7	J4	RED	RCA cable to Backbox Speaker Bar (right side RCA jack)
CPU USB 2.0 Port	J1-6	N/A	Hobbit Game Security Dongle	J5 Jack in the Back Assy			
CPU DVI Output	J1-7	N/A	DVI cable to LCD monitor (in backbox)	Sound Amplifier Bd, J3	J5	N/A	Not Used
CPU VGA Output	J1-8	N/A	VGA Cable to Book LCD monitor (on playfield)				
CPU LAN port	J1-9	N/A	Not Used				
CPU USB 2.0 Port	J1-10	N/A	USB to mini USB cable to I/O Bd, JUSB				
CPU USB 2.0 Port	J1-11	N/A	Not Used				
CPU Audio Line-In Input	J1-12	N/A	Not Used				
CPU Audio Line-Out Output	J1-13	N/A	3.5mm audio cable to Sound Amplifier Bd, J2				
CPU MIC Input	J1-14	N/A	Not Used				

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
J6 20-Volt Coil Drives (65-72)			
I/O Board, J112-1	J6-1	VIO	+70VDC supply to coils below
I/O Board, J112-10	J6-2	VIO-BLK	Not Used
I/O Board, J112-9	J6-3	VIO-BRN	Not Used
I/O Board, J112-8	J6-4	VIO-RED	Not Used
I/O Board, J112-7	J6-5	VIO-ORN	Coil drive 69 [DWARF Drop Target Retract]
I/O Board, J112-6	J6-6	VIO-YEL	Coil drive 68 [DWARF Drop Target Retract]
I/O Board, J112-5	J6-7	VIO-GRN	Coil drive 67 [DWARF Drop Target Retract]
I/O Board, J112-4	J6-8	VIO-BLU	Coil drive 66 [DWARF Drop Target Retract]
I/O Board, J112-3	J6-9	VIO-GRY	Coil drive 65 [DWARF Drop Target Retract]
	J6-10	Not Used	
	J6-11	Not Used	
	J6-12	Not Used	
	J6-13	Not Used	
	J6-14	Not Used	
	J6-15	Not Used	
	J6-16	Not Used	
	J6-17	Not Used	
	J6-18	Not Used	
	J6-19	Not Used	
	J6-20	Not Used	
J7 70-Volt Coil Drives (1-16)			
I/O Board, J105-1	J7-1	RED	+70VDC supply to coils below
I/O Board, J105-2	J7-2	RED-VIO	Coil drive 16 [Left Slingshot]
I/O Board, J105-3	J7-3	RED-BLU	Coil drive 15 [Orc Pop-Up Hold]
I/O Board, J105-4	J7-4	RED-GRN	Coil drive 14 [Orc Pop-Up Power]
I/O Board, J105-5	J7-5	RED-YEL	Coil drive 13 [Left Flipper Hold]
I/O Board, J105-6	J7-6	RED-ORN	Coil drive 12 [Left Flipper Power]
I/O Board, J105-7	J7-7	RED-GRY	Coil drive 11 [ELF Drop Target Reset]
I/O Board, J105-8	J7-8	RED-BRN	Coil drive 10 [ELF Drop Target Reset]
	J7-9	Not Used	
I/O Board, J105-10	J7-10	RED-BLK	Coil drive 9 [ELF Drop Target Reset]
I/O Board, J104-1	J7-11	BRN	+70V supply to coils below
I/O Board, J104-2	J7-12	BRN-VIO	Coil drive 8 [Ramp U-Turn Diverter]
I/O Board, J104-3	J7-13	BRN-BLU	Coil drive 7 [Goblin Pop-Up Hold]
I/O Board, J104-4	J7-14	BRN-GRN	Coil drive 6 [Goblin Pop-Up Power]
I/O Board, J104-5	J7-15	BRN-YEL	Coil drive 5 [Right Flipper Hold]
I/O Board, J104-6	J7-16	BRN-ORN	Coil drive 4 [Right Flipper Power]
I/O Board, J104-7	J7-17	BRN-RED	Coil drive 3 [MAN Drop Target Reset]
I/O Board, J104-8	J7-18	BRN-GRY	Coil drive 2 [MAN Drop Target Reset]

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
I/O Board, J104-9	J7-19	BRN-BLK	Coil drive 1 [MAN Drop Target Reset]
	J7-20	Not Used	
J8 70-Volt Coil Drives (17-32)			
I/O Board, J106-1	J8-1	ORN	+70VDC supply to coils below
I/O Board, J106-2	J8-2	ORN-VIO	Coil drive 24 [Right Slingshot]
I/O Board, J106-3	J8-3	ORN-BLU	Coil drive 23 [Warg Pop-Up Hold]
I/O Board, J106-4	J8-4	ORN-GRN	Coil drive 22 [Warg Pop-Up Power]
I/O Board, J106-5	J8-5	ORN-YEL	Coil drive 21 [DWARF Drop Target Reset]
I/O Board, J106-6	J8-6	ORN-GRY	Coil drive 20 [DWARF Drop Target Reset]
I/O Board, J106-7	J8-7	ORN-RED	Coil drive 19 [DWARF Drop Target Reset]
	J8-8	Not Used	
I/O Board, J106-9	J8-9	ORN-BRN	Coil drive 18 [DWARF Drop Target Reset]
I/O Board, J106-10	J8-10	ORN-BLK	Coil drive 17 [DWARF Drop Target Reset]
I/O Board, J107-1	J8-11	TAN	+70VDC supply to coils/magnet below
I/O Board, J107-2	J8-12	TAN-VIO	Coil drive 32 [Upper Slingshot]
I/O Board, J107-3	J8-13	TAN-BLU	Coil drive 31 [Spider Pop-Up Hold]
I/O Board, J107-4	J8-14	TAN-GRN	Coil drive 30 [Spider Pop-Up Power]
I/O Board, J107-5	J8-15	TAN-YEL	Coil drive 29 [Ramp Hold Magnet]
I/O Board, J107-6	J8-16	TAN-ORN	Coil drive 28 [Balin VUK]
	J8-17	Not Used	
I/O Board, J107-8	J8-18	TAN-RED	Coil drive 27 [Smaug Feed Diverter]
I/O Board, J107-9	J8-19	TAN-BRN	Coil drive 26 [Upper Right Flipper Hold]
I/O Board, J107-10	J8-20	TAN-BLK	Coil drive 25 [Upper Right Flipper Power]
J9 70-Volt Coil Drives (33-40) & Switch Matrix Rows			
I/O Board, J108-1	J9-1	PNK	+70VDC supply to coils below
I/O Board, J108-2	J9-2	PNK-VIO	Coil drive 40 [Knocker]
I/O Board, J108-3	J9-3	PNK-BLU	Coil drive 39 [Windlance/Kickback]
I/O Board, J108-4	J9-4	PNK-GRN	Coil drive 38 [5-Ball Trough VUK]
	J9-5	Not Used	
I/O Board, J108-5	J9-6	PNK-YEL	Coil drive 37 [Ball Auto-Launch]
I/O Board, J108-7	J9-7	PNK-ORN	Coil drive 36 [Radagast VUK]
I/O Board, J108-8	J9-8	PNK-RED	Coil drive 35 [Upper Pop Bumper]
I/O Board, J108-9	J9-9	PNK-BRN	Coil drive 34 [Right Pop Bumper]
I/O Board, J108-10	J9-10	PNK-BLK	Coil drive 33 [Left Pop Bumper]
I/O Board, J200-1	J9-11	WHT-BLK	Row 1 to playfield switches
I/O Board, J200-2	J9-12	WHT-BRN	Row 2 to playfield switches
I/O Board, J200-3	J9-13	WHT-RED	Row 3 to playfield switches
I/O Board, J200-4	J9-14	WHT-ORN	Row 4 to playfield switches
I/O Board, J200-5	J9-15	WHT-YEL	Row 5 to playfield switches

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
I/O Board, J200-6	J9-16	WHT-GRN	Row 6 to playfield switches
I/O Board, J200-7	J9-17	WHT-BLU	Row 7 to playfield switches
I/O Board, J200-8	J9-18	WHT-VIO	Row 8 to playfield switches
	J9-19	Not Used	
	J9-20	Not Used	

J10 Switch Matrix Columns

I/O Board, J201-1	J10-1	GRN-BLK	Column 1 to playfield switches
I/O Board, J201-2	J10-2	GRN-BRN	Column 2 to playfield switches
I/O Board, J201-3	J10-3	GRN-RED	Column 3 to playfield switches
I/O Board, J201-4	J10-4	GRN-ORN	Column 4 to playfield switches
I/O Board, J201-5	J10-5	GRN-YEL	Column 5 to playfield switches
I/O Board, J201-6	J10-6	GRN-GRY	Column 6 to playfield switches
I/O Board, J201-7	J10-7	GRN-BLU	Column 7 to playfield switches
I/O Board, J201-9	J10-8	GRN-VIO	Column 8 to playfield switches
	J10-9	Not Used	
	J10-10	Not Used	
I/O Board, J202-1	J10-11	GRY-BLK	Column 9 to playfield switches
I/O Board, J202-2	J10-12	GRY-BRN	Column 10 to playfield switches
I/O Board, J202-3	J10-13	GRY-RED	Column 11 to playfield switches
I/O Board, J202-4	J10-14	GRY-ORN	Not Used
I/O Board, J202-5	J10-15	GRY-YEL	Not Used
I/O Board, J202-6	J10-16	GRY-GRN	Not Used
I/O Board, J202-8	J10-17	GRY-BLU	Not Used
I/O Board, J202-9	J10-18	GRY-VIO	Not Used
	J10-19	Not Used	
	J10-20	Not Used	

J11 Ground

I/O Board, J701-5	J11-1	GRN	Cabinet ground
I/O Board, J701-6	J11-2	GRN	Cabinet ground

J12 RGB LED & GI LED Power

7.5/4VDC Pwr Supply	J12-1	BLK	Ground to RGB LED & BAG Controller Bds
7.5/4VDC Pwr Supply	J12-2	BLK	Ground to RGB LED & BAG Controller Bds
7.5/4VDC Pwr Supply	J12-3	BLK	Ground to RGB LED & BAG Controller Bds
	J12-4	Not Used	
	J12-5	Not Used	
	J12-6	Not Used	

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
7.5/4VDC Pwr Supply	J12-7	WHT	+4VDC to RGB LED Controller Bds
7.5/4VDC Pwr Supply	J12-8	WHT	+4VDC to RGB LED Controller Bds
7.5/4VDC Pwr Supply	J12-9	VIO	+7.5VDC to BAG Controller Bd

J13 AC Power Input

	J13-1	Not Used	
	J13-2	Not Used	
	J13-3	Not Used	
	J13-4	Not Used	
I/O Board, J702-3	J13-5	GRY	10VAC from transformer (across GRY lines)
I/O Board, J702-4	J13-6	GRY	10VAC from transformer (across GRY lines)
I/O Board, J702-1	J13-7	YEL	18VAC from transformer (across YEL lines)
I/O Board, J702-2	J13-8	YEL	18VAC from transformer (across YEL lines)
I/O Board, J701-2	J13-9	RED	49VAC from transformer (across RED lines) - through coin door interlock switch
I/O Board, J701-1	J13-10	RED	49VAC from transformer (across RED lines)
I/O Board, J701-4	J13-11	BLU	49VAC from transformer (across BLU lines) - through coin door interlock switch
I/O Board, J701-3	J13-12	BLU	49VAC from transformer (across BLU lines)

J14 Book LCD, RGB LED & BAG Controller Board Power

Primary ATX Pwr Supply	J14-1	YEL	+12VDC to Book LCD monitor
Primary ATX Pwr Supply	J14-2	BLK	Ground to Book LCD monitor
Primary ATX Pwr Supply	J14-3	BLK	Not Used
Primary ATX Pwr Supply	J14-4	RED	+5VDC to RGB LED & BAG Controller Bds

J15 Coin Door, Backbox & Opto I/O Board Power

Primary ATX Pwr Supply	J15-1	YEL	+12VDC to coin door, backbox light & 27" LCD monitor
Primary ATX Pwr Supply	J15-2	BLK	Ground to coin door, backbox light & 27" LCD monitor
Primary ATX Pwr Supply	J15-3	BLK	Ground to Opto I/O Bds, Smaug Controller Bd & 5-Ball Trough Transmitter & Receiver Bds
Primary ATX Pwr Supply	J15-4	RED	+5VDC to Opto I/O Bds, Smaug Controller Bd & 5-Ball Trough Transmitter & Receiver Bds

J16 Not Used

J16-1	Not Used
J16-2	Not Used
J16-3	Not Used
J16-4	Not Used

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
J17 Dedicated Switches (1-8)			
I/O Board, J601-1	J17-1	BLK	Dedicated switch common (Ground)
	J17-2	Not Used	
I/O Board, J601-4	J17-3	BLK-ORN	Not Used
I/O Board, J601-5	J17-4	BLK-RED	Dedicated switch return 3 [Upper Right Flipper EOS]
I/O Board, J601-6	J17-5	BLK-BRN	Dedicated switch return 2 [Right Flipper EOS]
I/O Board, J603-1	J17-6	BLK	Dedicated switch common (Ground)
I/O Board, J601-7	J17-7	BLK-GRY	Dedicated switch return 1 [Left Flipper EOS]
	J17-8	Not Used	
I/O Board, J601-3	J17-9	BLK-GRN	Not Used
I/O Board, J601-2	J17-10	BLK-YEL	Not Used

J18 12-Volt Coil Drives (41, 43-48, 73-80)			
I/O Board, J109-1	J18-1	YEL	+12VDC supply to motors/lights below
I/O Board, J109-10	J18-2	YEL-VIO	Coil drive 48 [Spotlights, Upper]
I/O Board, J109-9	J18-3	YEL-BLU	Coil drive 47 [Left Pop Bumper Light]
I/O Board, J109-8	J18-4	YEL-GRN	Coil drive 46 [Smaug Stepper Motor 4]
I/O Board, J109-7	J18-5	YEL-GRY	Coil drive 45 [Smaug Stepper Motor 3]
I/O Board, J109-6	J18-6	YEL-ORN	Coil drive 44 [Smaug Stepper Motor 2]
I/O Board, J109-4	J18-7	YEL-RED	Coil drive 43 [Smaug Stepper Motor 1]
	J18-8	Not Used	
I/O Board, J109-3	J18-9	YEL-BRN	Coil drive 42 [Shaker Motor]
I/O Board, J109-2	J18-10	YEL-BLK	Coil drive 41 [Spotlights, Lower]
I/O Board, J113-2	J18-11	LT BLU	+12VDC supply to motor/light below
I/O Board, J113-10	J18-12	LT BLU-VIO	Coil drive 80 [Redemption Ticket Motor]
I/O Board, J113-9	J18-13	LT BLU-GRY	Coil drive 79 [Start Button Light]
I/O Board, J113-8	J18-14	LT BLU-GRN	Not Used
I/O Board, J113-7	J18-15	LT BLU-YEL	Not Used
I/O Board, J113-6	J18-16	LT BLU-ORN	Not Used
I/O Board, J113-5	J18-17	LT BLU-RED	Not Used
	J18-18	Not Used	
I/O Board, J113-4	J18-19	LT BLU-BRN	Not Used
I/O Board, J113-3	J18-20	LT BLU-BLK	Not Used

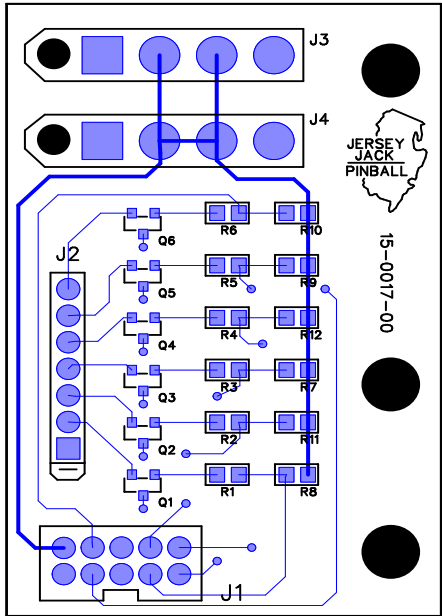
J19 20-Volt Coil Drives (49-64)			
I/O Board, J110-1	J19-1	PLM	+20VDC supply to coils/magnets below
	J19-2	Not Used	
I/O Board, J110-10	J19-3	PLM-GRY	Not Used
I/O Board, J110-9	J19-4	PLM-BLU	Not Used
I/O Board, J110-8	J19-5	PLM-GRN	Coil drive 54 [Top Magnet, Right]
I/O Board, J110-7	J19-6	PLM-YEL	Coil drive 53 [Top Magnet, Left]

Inside PCB Chassis	Pin	Wire Color	Outside PCB Chassis
I/O Board, J110-6	J19-7	PLM-ORN	Not Used
I/O Board, J110-5	J19-8	PLM-RED	Coil drive 51 [ELF Drop Target Retract]
I/O Board, J110-3	J19-9	PLM-BRN	Coil drive 50 [ELF Drop Target Retract]
I/O Board, J110-2	J19-10	PLM-BLK	Coil drive 49 [ELF Drop Target Retract]
I/O Board, J111-1	J19-11	BLU	+20VDC supply to coils below
	J19-12	Not Used	
I/O Board, J111-10	J19-13	BLU-VIO	Not Used
I/O Board, J111-9	J19-14	BLU-GRY	Not Used
I/O Board, J111-8	J19-15	BLU-GRN	Coil drive 62 [Windlance Diverter]
I/O Board, J111-7	J19-16	BLU-YEL	Coil drive 61 [Subway Diverter]
I/O Board, J111-6	J19-17	BLU-ORN	Coil drive 60 [Windlance Hold]
I/O Board, J111-5	J19-18	BLU-RED	Coil drive 59 [MAN Drop Target Retract]
I/O Board, J111-4	J19-19	BLU-BRN	Coil drive 58 [MAN Drop Target Retract]
I/O Board, J111-2	J19-20	BLU-BLK	Coil drive 57 [MAN Drop Target Retract]
J20 Dedicated Switches (9-27) & Coil Drives (40, 42)			
I/O Board, J109-3	J20-1	YEL-BRN	Coil drive 42 [Shaker Motor]
I/O Board, J604-6	J20-2	VIO-BRN	Dedicated switch return 26 [Coin Door Open]
I/O Board, J602-1	J20-3	BLK	Dedicated switch common (Ground)
I/O Board, J602-10	J20-4	YEL-VIO	Dedicated switch return 16 [Escape/Service Credit Button]
I/O Board, J602-8	J20-5	YEL-BLU	Dedicated switch return 15 [Down/Volume- Button]
I/O Board, J602-3	J20-6	YEL-GRN	Dedicated switch return 14 [Up/Volume+ Button]
I/O Board, J602-2	J20-7	YEL-GRY	Dedicated switch return 13 [Enter/Menu Button]
I/O Board, J602-4	J20-8	YEL-ORN	Dedicated switch return 12 [Right Flipper Switch, Upper]
I/O Board, J602-5	J20-9	YEL-RED	Dedicated switch return 11 [Right Flipper Switch, Lower]
I/O Board, J602-6	J20-10	YEL-BRN	Not Used
I/O Board, J602-7	J20-11	YEL-BLK	Dedicated switch return 9 [Left Flipper Switch]
I/O Board, J108-2	J20-12	PNK-VIO	Coil drive 40 [Knocker]
I/O Board, J109-1 (wire loop from J18-1)	J20-13	YEL	+12VDC supply to Shaker Motor
I/O Board, J604-8	J20-14	VIO-BLK	Dedicated switch return 25 [Start Button]
I/O Board, J604-1	J20-15	BLK	Dedicated switch common (Ground)
I/O Board, J604-5	J20-16	VIO-RED	Dedicated switch return 27 [Ring Button]
I/O Board, J604-4	J20-17	VIO-ORN	Not Used
I/O Board, J603-3	J20-18	BLU-GRN	Dedicated switch return 22 [Ticket Mech Notch Switch]
I/O Board, J603-2	J20-19	BLU-YEL	Dedicated switch return 21 [5th Coin Slot Switch]
I/O Board, J603-4	J20-20	BLU-ORN	Dedicated switch return 20 [4th Coin Slot Switch]
I/O Board, J603-5	J20-21	BLU-RED	Dedicated switch return 19 [Center Dollar Bill Acceptor]
I/O Board, J603-6	J20-22	BLU-BRN	Dedicated switch return 18 [Right Coin Switch]
I/O Board, J603-7	J20-23	BLU-BLK	Dedicated switch return 17 [Left Coin Switch]
I/O Board, J108-1	J20-24	PNK	+70VDC supply to Knocker Coil

European Coin Door Board

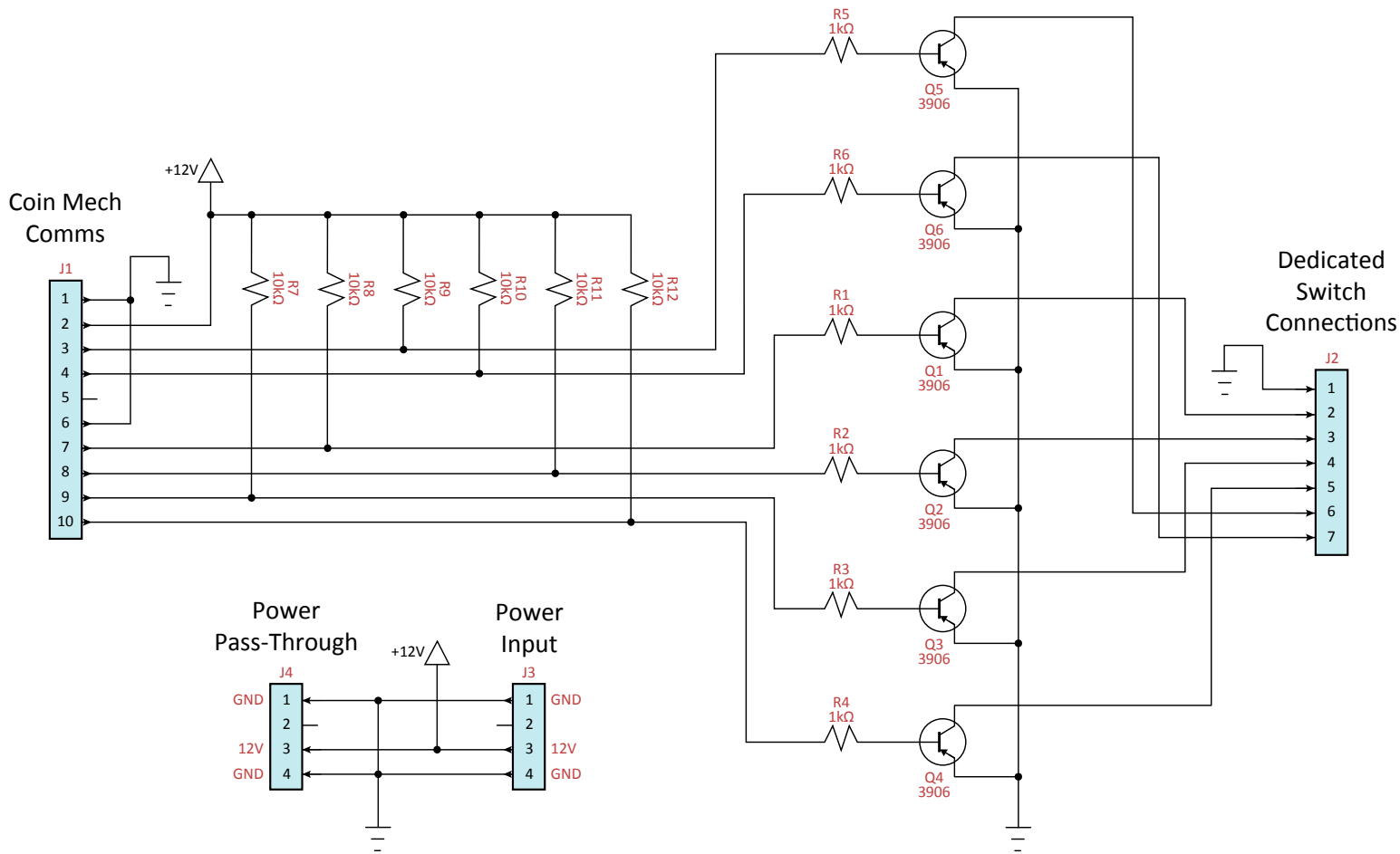
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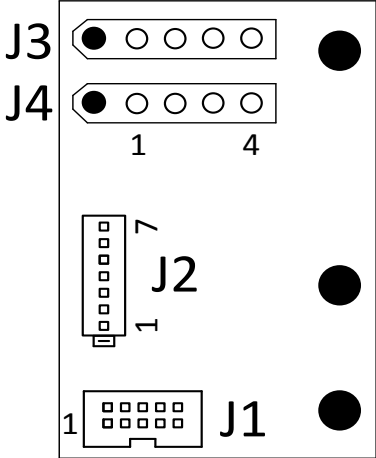
Component(s)	Part Number	Description
Q1-Q6	131-0001-0S	Transistor, 3906, SOT-23 SMT, PNP
R1-R6	120-1K00-124	Resistor, 0805 SMT, 1kΩ, 0.125W, 5%
R7-R12	120-10K0-124	Resistor, 0805 SMT, 10kΩ, 0.125W, 5%
J1	31-2513-10	Connector Header, Male, 10-pin, 2 Rows, 2.54mm
J2	31-2504-07	Header, Male, 7-pin, 2.54mm
J3, J4	31-2512-04	Connector Header, Male, 4-pin, 5.03mm



European Coin Door Board

15-0017-00





European Coin Door Board
15-0017-00
Connector Pin-outs

J1 Coin Mech Comms

10-pin Ribbon cable		
J1-1	->	
J1-2	->	
J1-3	->	
J1-4	->	Communications
J1-5	->	with coin
J1-6	->	mechanisms
J1-7	->	in coin door
J1-8	->	
J1-9	->	
J1-10	->	

J2 Dedicated Switch Connections

J2-1	BLK	Dedicated switch common (Ground), I/O Board, J603-1
J2-2	BLU-BLK	Dedicated switch return 17 [Left Coin Switch], I/O Board, J603-7
J2-3	BLU-BRN	Dedicated switch return 18 [Right Coin Switch], I/O Board, J603-6
J2-4	BLU-RED	Dedicated switch return 19 [Center Dollar Bill Acceptor], I/O Board, J603-5
J2-5	BLU-ORN	Dedicated switch return 20 [4th Coin Slot Switch], I/O Board, J603-4
J2-6	BLU-YEL	Dedicated switch return 21 [5th Coin Slot Switch], I/O Board, J603-2
J2-7	BLU-GRN	Dedicated switch return 22 [Ticket Mech Notch Switch], I/O Board, J603-3

J3 DC Power Input

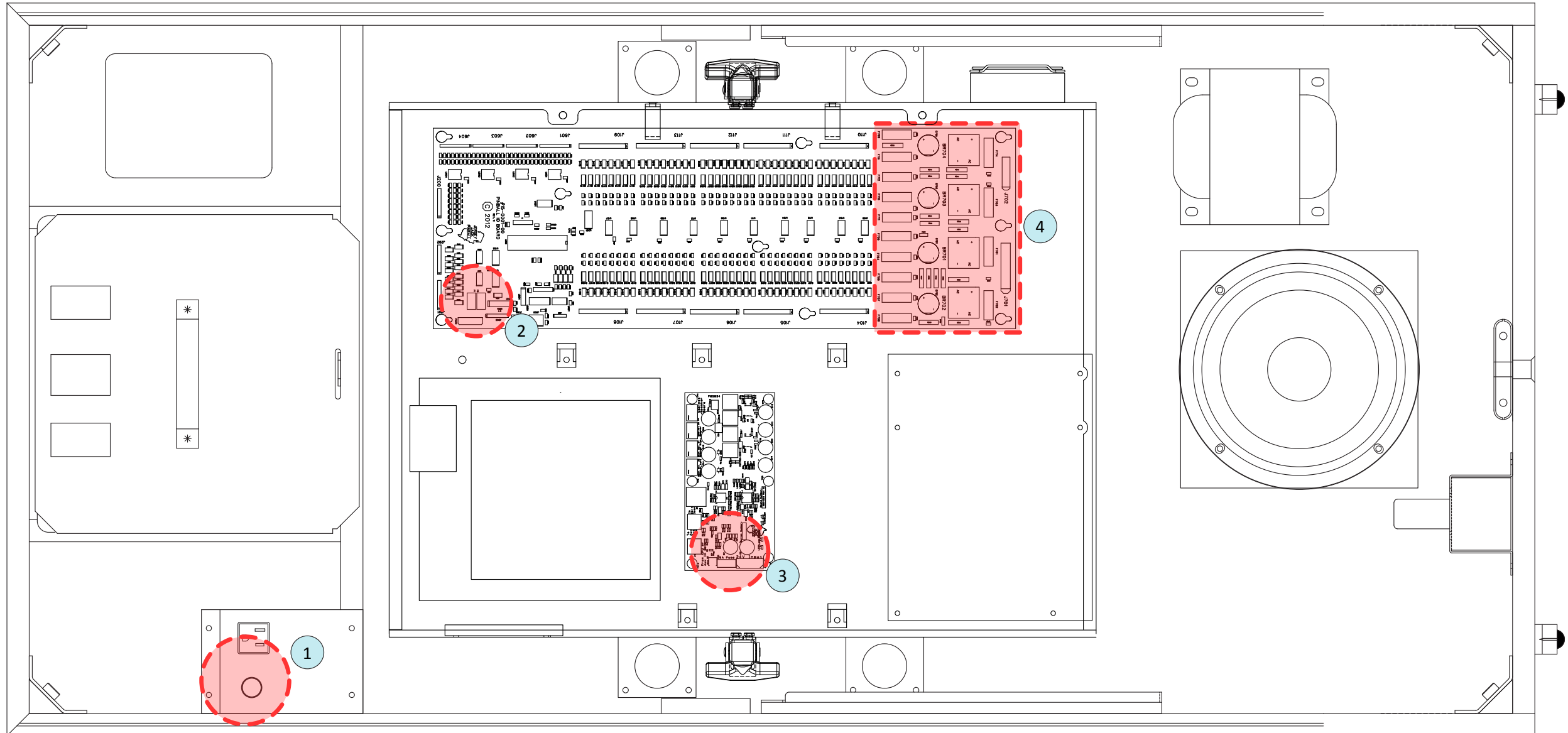
J3-1	BLK	Ground from Primary ATX Pwr Supply
J3-2	Not Used	
J3-3	YEL	+12VDC from Primary ATX Pwr Supply
J3-4	BLK	Ground from Primary ATX Pwr Supply

J4 Power Pass-Through

J4-1	BLK	Ground to coin door
J4-2	Not Used	
J4-3	YEL	+12VDC to coin door
J4-4	BLK	Ground to coin door

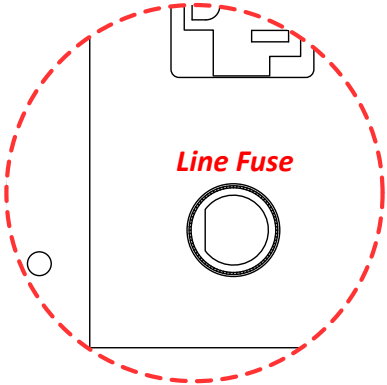
Note: All European Coin Door Board connections to J2-J4 pass through an in-line connector mounted in back panel of Cabinet PCB Chassis Assembly.

Fuse Locations

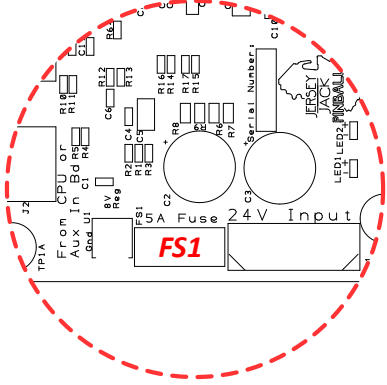


Fuse Information

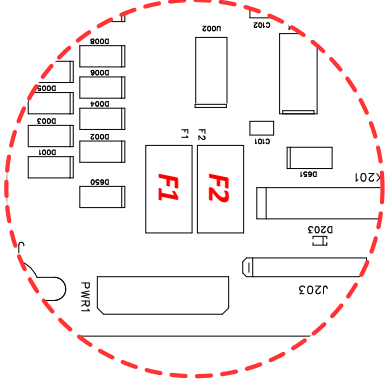
1 Power Box Assembly



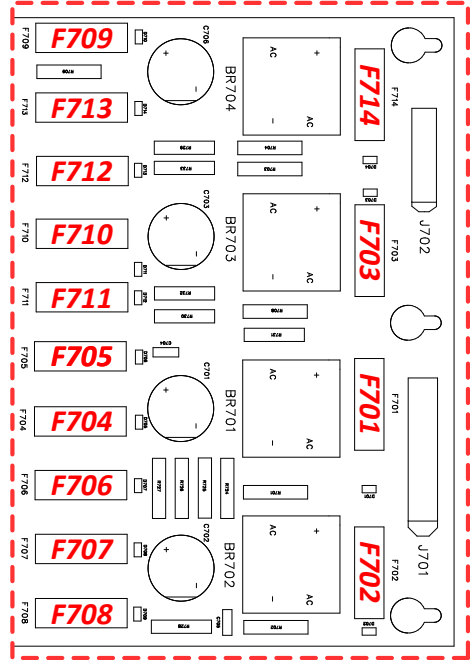
3 Sound Amplifier Board



2 I/O Board



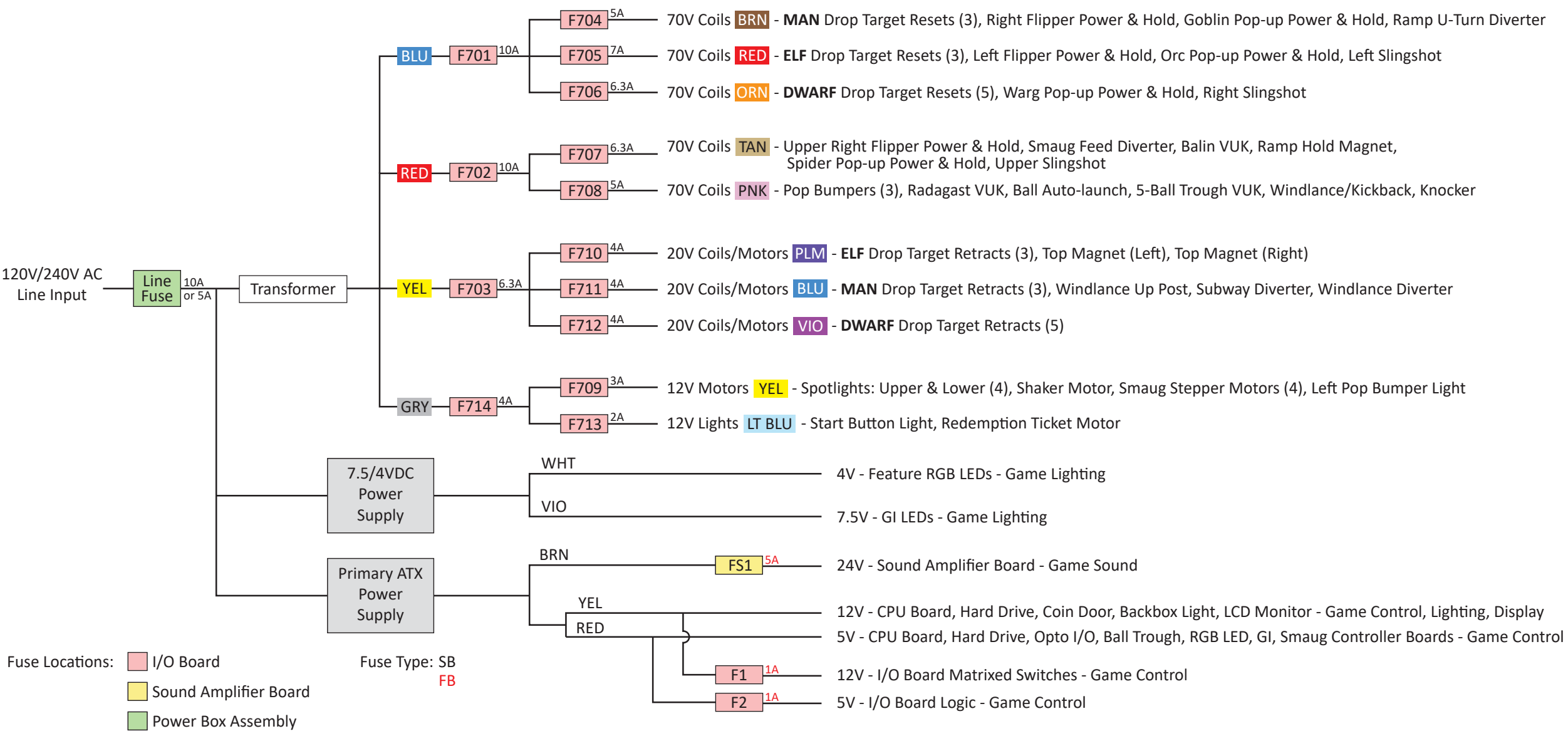
4 I/O Board



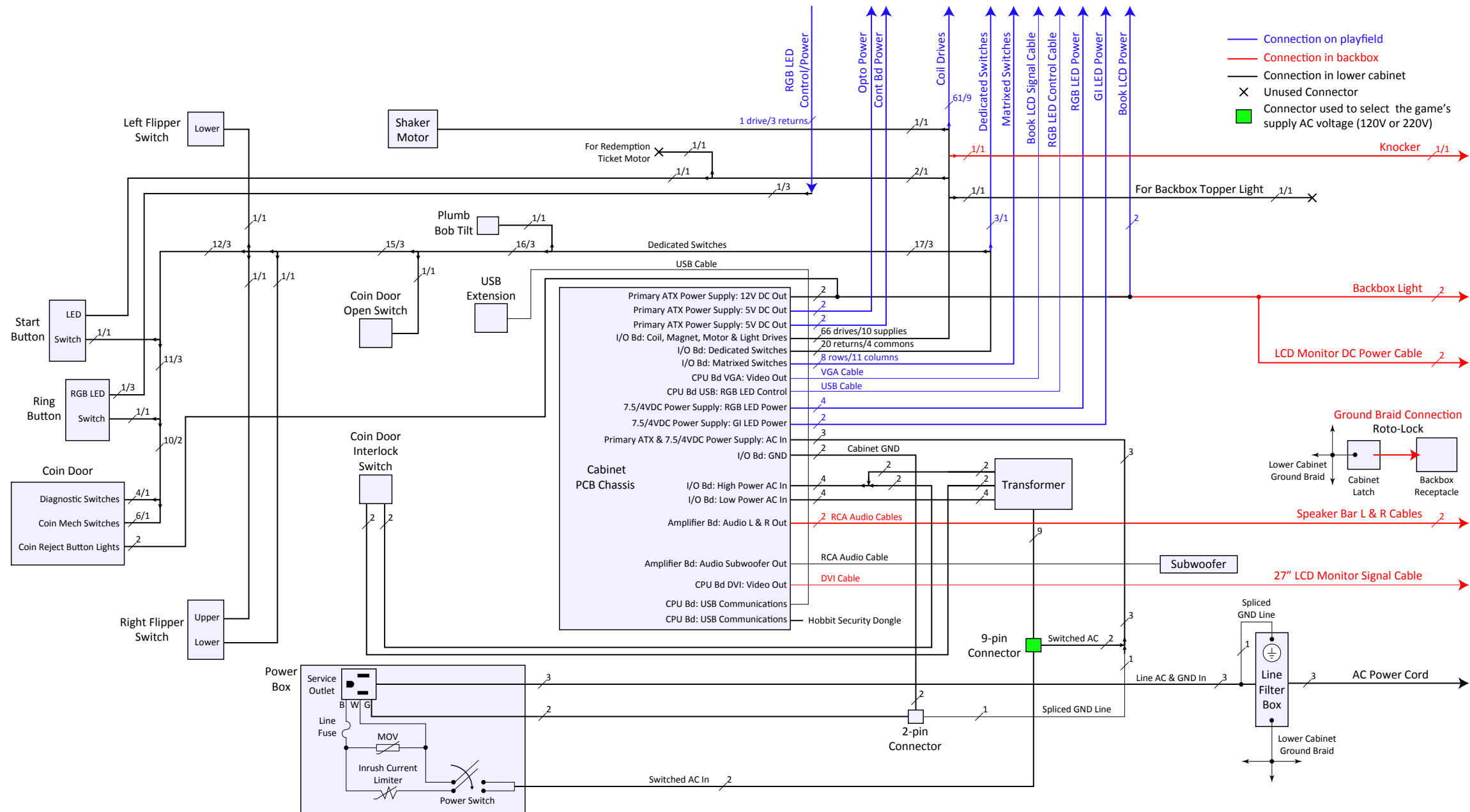
Fuse Identifier(s)	Description	Part Number
F701, F702	Fuse, Time Delay, 10A, 250V, 5mm x 20mm	170-0110-SM
F703, F706, F707	Fuse, Time Delay, 6.3A, 250V, 5mm x 20mm	170-0163-SM
F705	Fuse, Time Delay, 7A, 250V, 5mm x 20mm	170-0107-SM
F704, F708	Fuse, Time Delay, 5A, 250V, 5mm x 20mm	170-0105-SM
F710, F711, F712, F714	Fuse, Time Delay, 4A, 250V, 5mm x 20mm	170-0104-SM
F709	Fuse, Time Delay, 3A, 250V, 5mm x 20mm	170-0103-SM
F713	Fuse, Time Delay, 2A, 250V, 5mm x 20mm	170-0102-SM

Fuse Identifier(s)	Description	Part Number
F1, F2	Fuse, Fast-Acting, 1A, 32V, Mini Blade	170-3201-FB
FS1	Fuse, Fast-Acting, 5A, 32V, Mini Blade	170-3205-SB
125V Line Fuse	Fuse, Slow Blow, 10A, 125V, 0.25" x 1.25", 3AG	170-0110-SR
250V Line Fuse	Fuse, Slow Blow, 5A, 250V, 0.25" x 1.25", 3AG	170-0205-SR

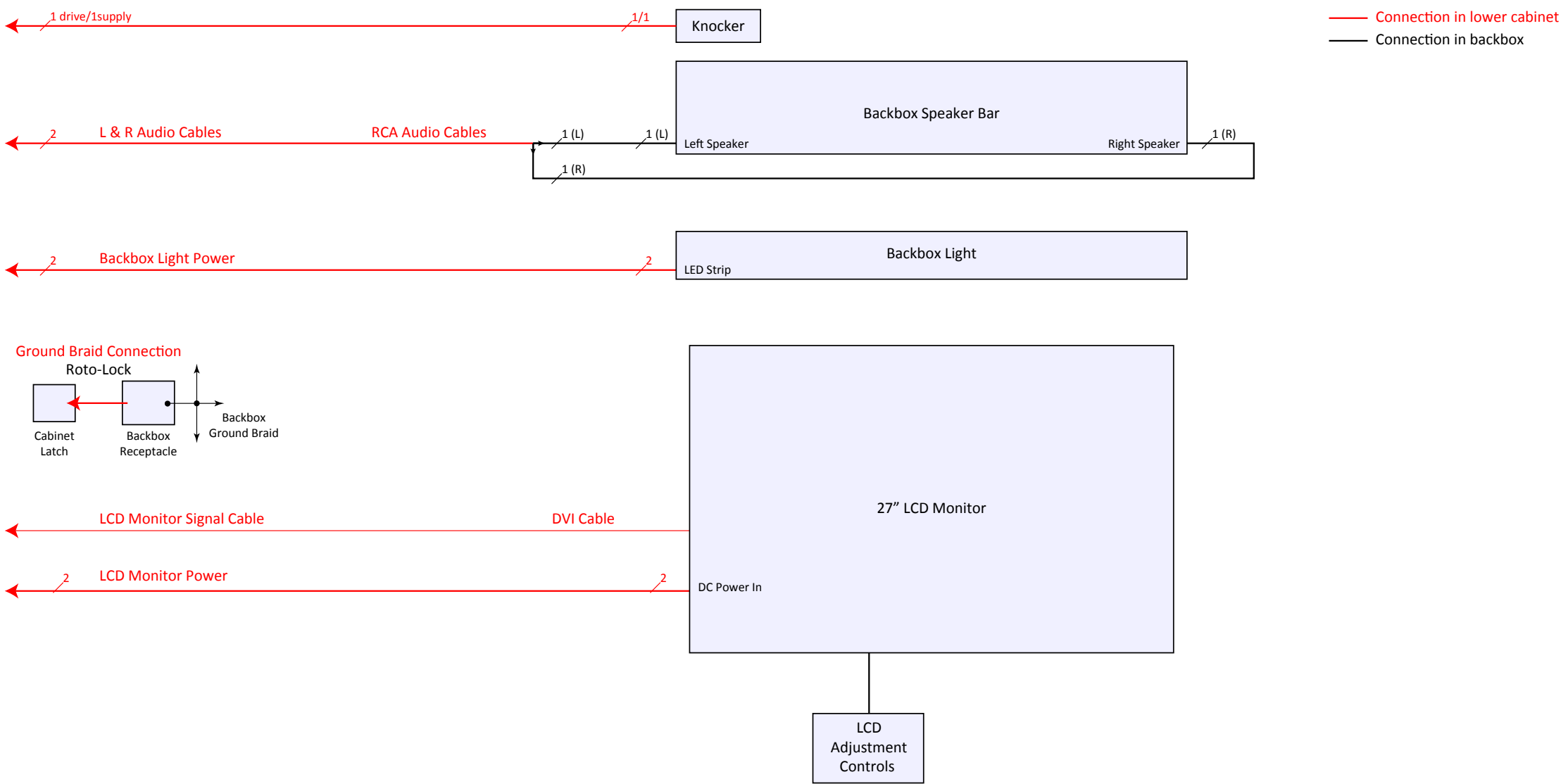
Fused Power Stream



Lower Cabinet Wiring Diagram

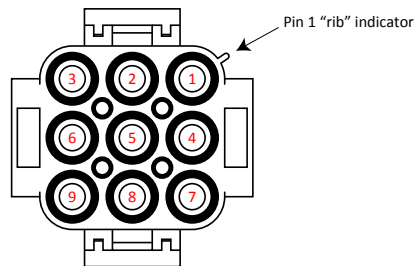


Backbox Wiring Diagram

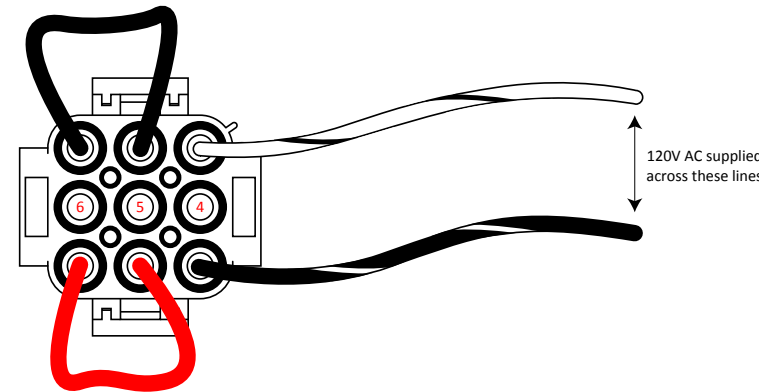


Supply Voltage Conversion

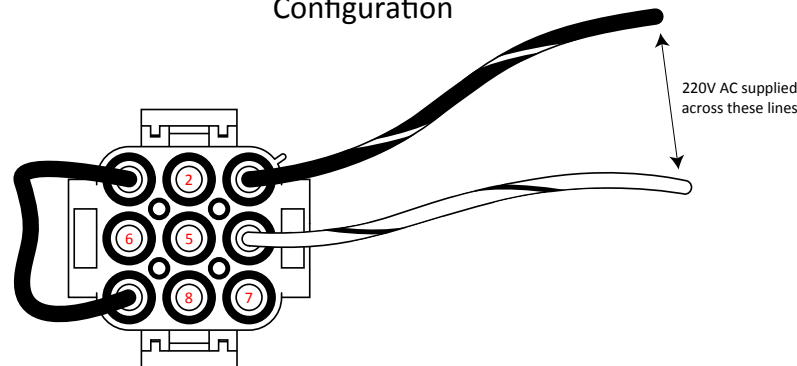
Voltage Conversion
Connector Pin-out



Hobbit 120V AC
Configuration



Hobbit 220V AC
Configuration



If you need to convert your game to a different supply voltage than it was wired for at the factory, locate the 9-pin connector at the input of the transformer, in the bottom of the lower cabinet (shown opposite and in the green box on page D-111).

Power the game down and disconnect the 9-pin connector (it has locking tabs on each side). Looking at the back of the jumpered connector (the end with the wires protruding), locate the pin 1 “rib” indicator and orient the connector so that it is in the upper right hand corner, as shown opposite. The red numbers show pin numbers for the entire connector.

Look at the illustration for the desired configuration and compare it to the current configuration. Using a 0.084” pin extractor, remove all pins that require repositioning by pushing them out of the back of the connector, from the front. You can reuse existing wires as long as they were not damaged during the removal process. Fashion new, short jumper wires, as needed.

Using the appropriate illustration for reference, insert the jumper pins all the way into the connector, in the proper positions, from the back side, until they lock in place.

For a 120V supply voltage, connect the AC inputs across pins 1 & 7. Next, jumper pins 2 & 3 together with a short piece of black wire. Lastly, jumper pins 8 & 9 together with a short piece of orange wire.

For a 220V supply voltage, connect the AC inputs across pins 1 & 4. Then jumper pins 3 & 9 together with a short piece of black wire.

Note: Your Hobbit game makes use of switching, modular power supplies for the RGB LED & GI lighting systems (4V and 7.5V), the sound amplifier board (24V), the CPU board (5V & 12V ATX supply) and/or other game functions. These switching power supplies have voltage selection slide switches on their exterior panels that must be in the proper position (120V or 220V) before applying power to the game.



Section E

Game Service & Troubleshooting



E.1 The Hobbit Smaug Assembly

Removing the Smaug Assembly

Preparations: Ensure that all 5 pinballs are in the trough or completely removed from the game (not in the shooter lane, sub-way or either of the VUK holes). Power down the game.

Tools Required:

Wire cutters
#2 Phillips screwdriver

1) Remove the playfield glass, raise the playfield and lean it against the backbox as shown in figure E1; locate the hole circled in the illustration. Unplug the ethernet cable from the underside of the Smaug Controller PCB. Unplug the two inline connectors for the Smaug Assembly from the main wiring harness, under the playfield:

6-pin, GRN-ORN/WHT-ORN/WHT-GRN/BLK/RED wires

6-pin, BLK/YEL/GRN/RED/WHT/BLU wires

Use wire cutters to carefully cut any nylon ties holding cables/wires still attached to the Smaug Assembly.

2) Using the #2 Phillips screwdriver, remove the three screws holding the Smaug Assembly in place. **CAUTION:** As you remove the last screw, reach around the edge of the playfield with one hand to support the Smaug Assembly on the playfield surface. When all three mounting screws are out, the entire assembly will be free.

Slowly - and carefully - move the Smaug Assembly away from the playfield surface, ensuring that all cables, connectors and wiring remain free during the process.

Place the Smaug Assembly on a flat surface. The assembly will rest in the upright position, using the bottom of the stepper motor as its base.

To reinstall the Smaug assembly, perform the steps above, in reverse order.

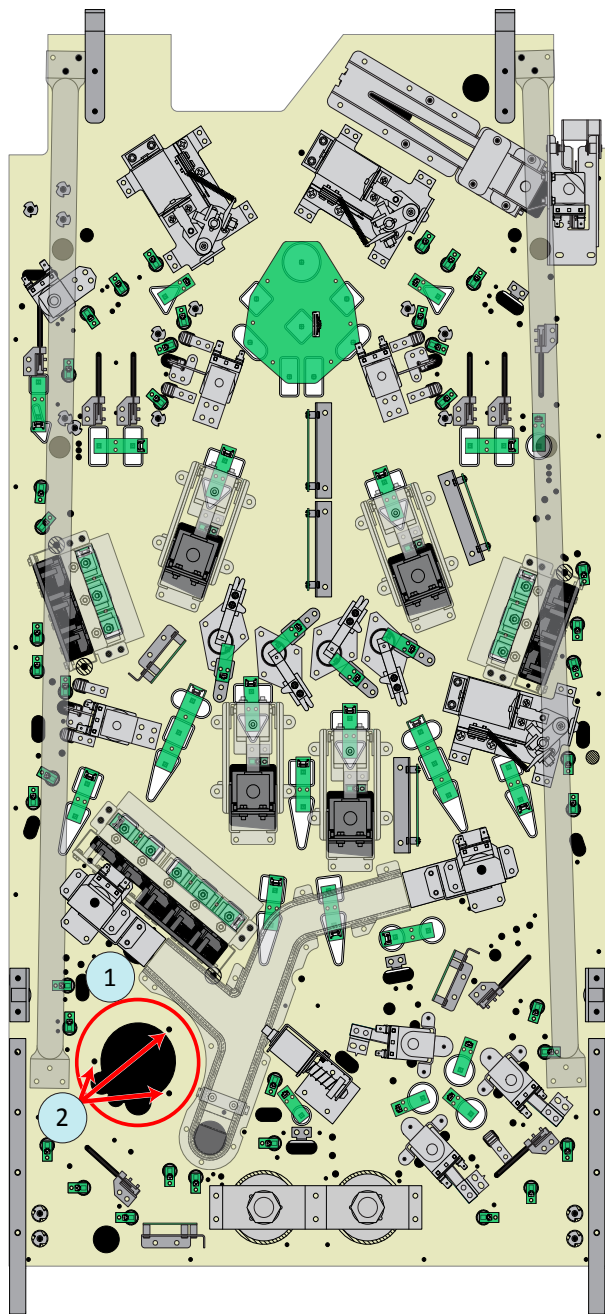


Figure E1. Playfield underside - Smaug Assembly location.

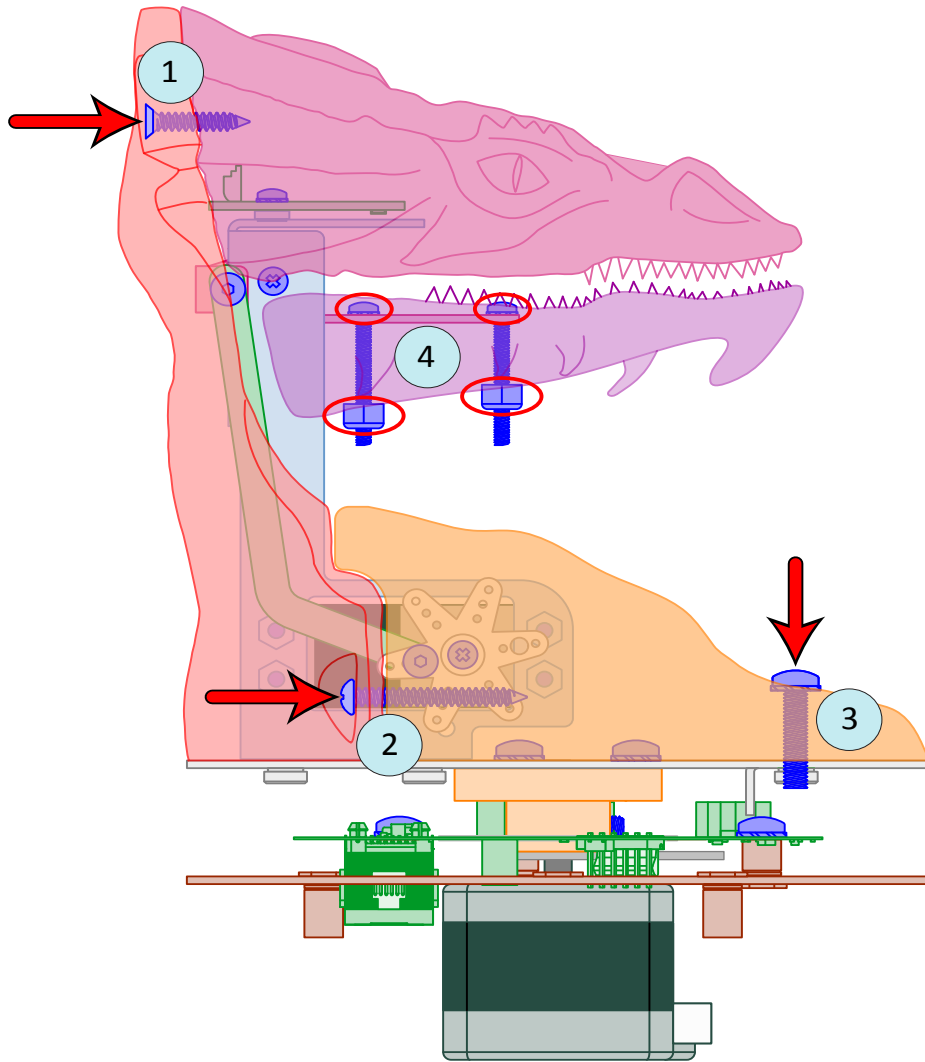


Figure E2. Smaug Assembly.

Disassembling the Sculpture

Preparations: Disconnect and remove the Smaug Assembly from the playfield and place it on a flat surface, using the bottom of the stepper motor as a base.

Tools Required:

#1 Phillips screwdriver
#2 Phillips screwdriver
1/4" wrench or socket/ratchet

1) Using the #2 Phillips screwdriver, remove the two sheet metal screws (one on either side) holding Smaug's head/upper jaw sculpture in place (see figure E2). **CAUTION:** As you remove the head/upper jaw sculpture, carefully unplug the connectors for the two GI LED Boards behind Smaug's eyes. Do not pull or kink the wiring for Smaug's eyes as you remove the head. Set the head/upper jaw sculpture safely aside.

2) With the same screwdriver, remove the two sheet metal screws (one on either side) holding the Smaug back sculpture to the gold pile (base) sculpture. Set the Smaug back sculpture safely aside.

3) Again, using the #2 Phillips screwdriver, remove the two brass machine screws (one on either side) holding the gold pile sculpture to the steel top plate. Set the gold pile sculpture safely aside.

With the head/upper jaw, back and gold pile sculptures removed, you will have easy access to most of the Smaug Assembly components. For detailed drawings and parts listings, see page C-46 of this manual. Only remove Smaug's bottom jaw & lower teeth sculptures if necessary.

4) If the bottom jaw & lower teeth sculptures must be removed, use the #1 Phillips screwdriver (from above) and the 1/4" wrench or socket (from below) to completely remove the two lock nuts under the jaw. Carefully separate the lower teeth and bottom jaw sculptures and remove them, making sure you do not bend the steel jaw bracket at all during the process.

To reattach the Smaug sculpture pieces, perform the above steps, in reverse order.

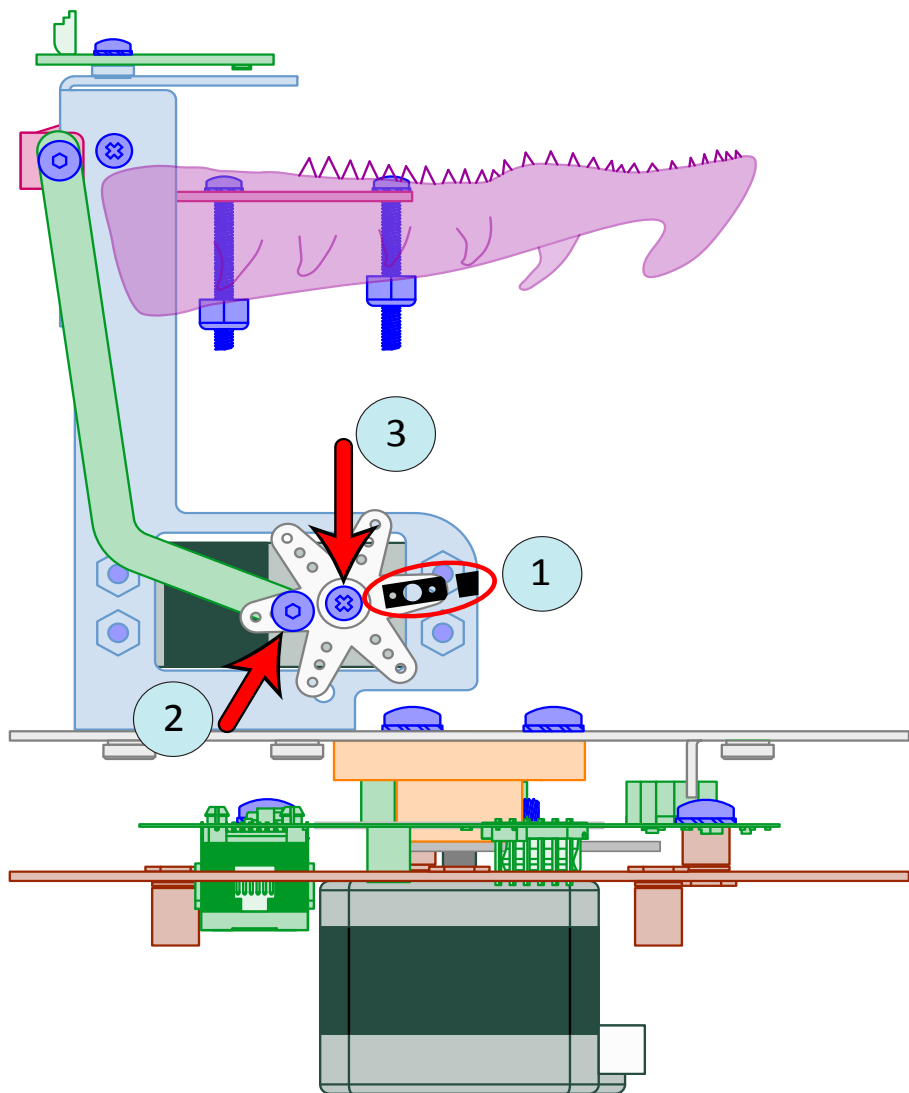


Figure E3. Smaug Assembly with most sculpture pieces removed.

Removing the Jaw Crank Link & Servo Horn

Preparations: Disconnect and remove the Smaug Assembly from the playfield and place it on a flat surface, using the bottom of the stepper motor as a base. Remove the head/upper jaw, back and gold pile sculptures from the assembly.

Tools Required:

#2 Phillips screwdriver
5/64" allen wrench

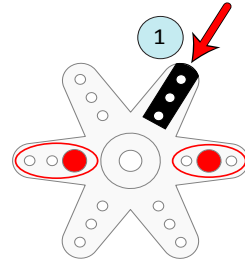
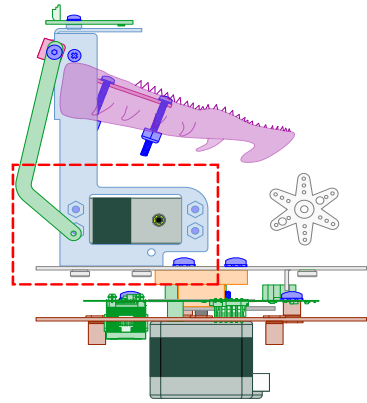
1) Before disassembling or disconnecting anything, use tape or a felt tip marker to mark the position of one arm of the star-shaped servo horn (as shown in black in figure E3). Make one mark on the arm itself, then one on the Smaug main support bracket, next to the arm. You will need these marks to properly orient the servo horn when you reinstall it later.

2) While holding the jaw crank link (green in figure E3) firmly with one hand, use the 5/64" allen wrench to remove the shoulder bolt holding the link to the servo horn. After the bolt is out, ensure that the marks you made on the horn and bracket are still aligned.

3) While firmly holding the servo horn, use the Phillips screwdriver to remove the screw that holds it on the servo motor hub. To remove the servo horn, grasp it firmly and pull straight out, away from the servo motor.

IMPORTANT: DO NOT allow the motor hub/shaft to turn **AT ALL** as you remove the screw or the servo horn!

To reinstall the servo arm and reconnect the jaw crank link, perform the steps above, in reverse order. When reattaching the servo horn, carefully align the marks you made in step 1) as you firmly press the horn back onto the servo hub. Again, do not allow the motor hub/shaft to turn at all while the horn is removed or as it is being reinstalled.



Calibrating the Servo Horn

Preparations: Disconnect and remove the Smaug Assembly from the playfield and place it on a flat surface, using the bottom of the stepper motor as a base. Remove the head/upper jaw, back and gold pile sculptures from the assembly. Disconnect the jaw crank link from the servo horn, then remove the horn from the servo motor hub.

Tools Required:

#2 Phillips screwdriver
5/64" allen wrench

1) Orient the star-shaped servo horn as shown in figure E4, upper right (pay particular attention to the two arms of the horn that have larger holes drilled in them). Use tape or a felt tip marker to mark the arm indicated in the illustration. After adding the mark to the horn, firmly push it onto the hub of the servo motor - rotational orientation of the horn is unimportant.

2) Manually rotate the servo horn counterclockwise until you reach the motor's hard stop (figure E4, mid left). **DO NOT** use excessive force. When the stop is reached, grasp the horn firmly and pull it straight out, away from the servo motor.

3) Align the servo horn as shown in figure E4, mid right, with your mark at horizontal and to the left of the hub. **WITHOUT TURNING THE HUB AT ALL**, firmly push the horn straight onto the servo motor hub.

4) Manually rotate the servo horn clockwise until the marked servo arm is at an angle of approximately 45 degrees (figure E4, bottom left). Again, **WITHOUT TURNING THE HUB AT ALL**, grasp the horn firmly and pull it straight out, away from the servo motor.

5) Attach the servo horn to the Smaug jaw crank link with a 4-40 x 1/8" x 3/32", socket head, shoulder bolt (figure E4, lower right). **It is very important to attach the link to the servo arm indicated in the illustration!** Use the 5/64" allen wrench to firmly tighten the shoulder bolt into the crank link.

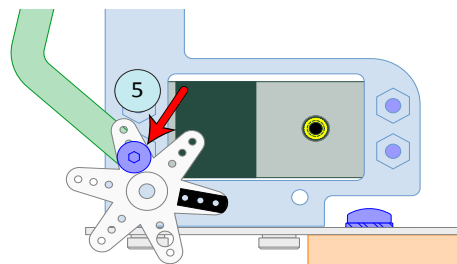
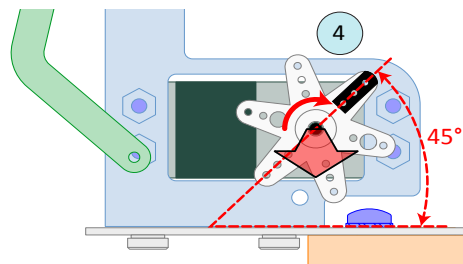
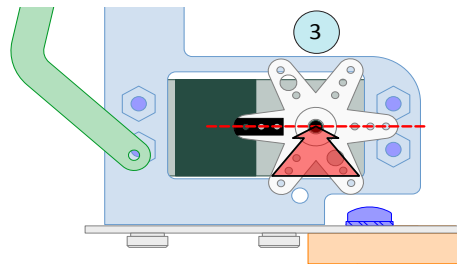
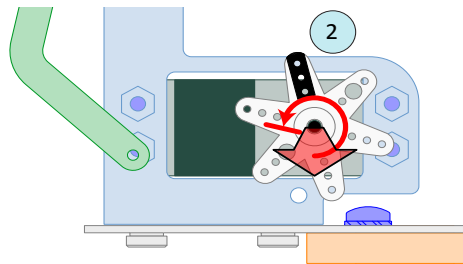


Figure E4. Calibrating the Smaug Assembly servo horn.

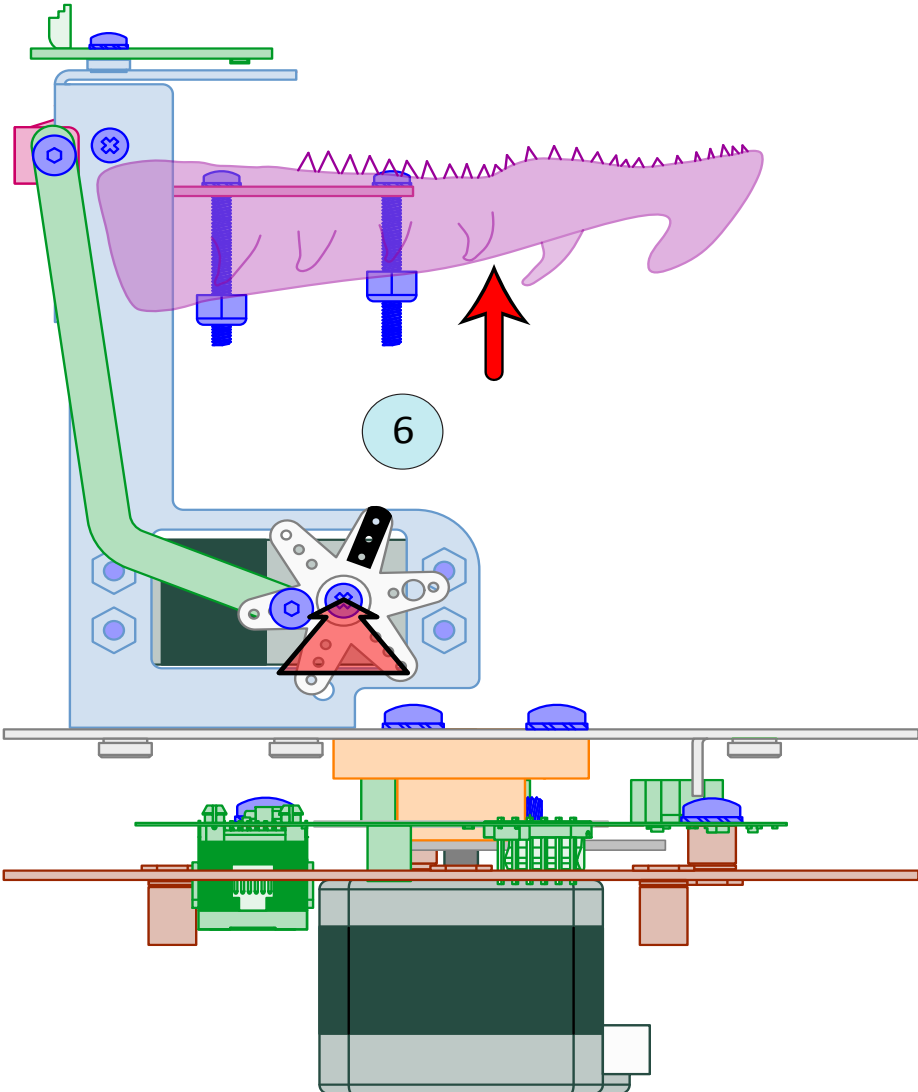


Figure E5. Smaug Assembly with crank link reconnected.

6) While holding Smaug's lower jaw in the highest position possible (as "closed" as possible), firmly press the servo horn completely back onto the servo motor hub (figure E5). **IMPORTANT: DO NOT** allow the motor hub/shaft to turn **AT ALL** as you reinstall the servo horn! Using the #2 Phillips screwdriver, install the retaining screw, through the center of the servo horn, into the end of the servo motor hub. Tighten the screw until snug - **DO NOT OVERTIGHTEN!**

7) After reattaching the sculpture pieces and reinstalling the Smaug assembly in your game, use the Smaug Mouth Test (figure E6) in the diagnostics menu to complete the jaw calibration process. For additional information on running the Smaug Mouth Test and making jaw limit adjustments, see page B-21 of this manual.

WARNING:
NEVER attempt to move Smaug's jaw up or down when power is applied to the assembly (i.e., anytime the game is powered ON); these actions can result in serious damage to the jaw crank link, servo horn or servo motor.

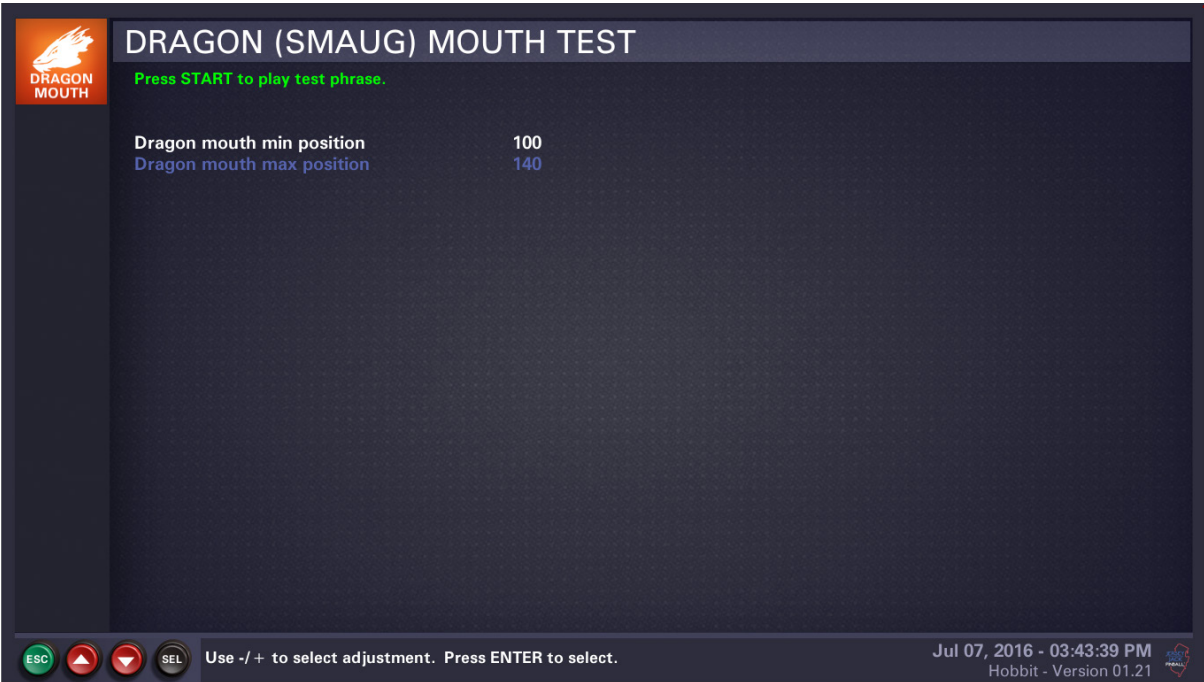


Figure E6. Smaug Mouth Test diagnostics screen.

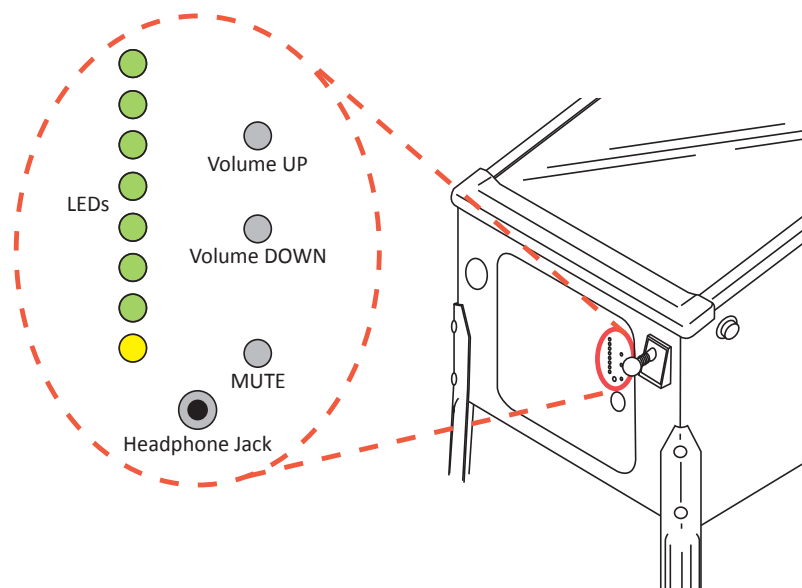


Figure E7. Coin door sound controls.

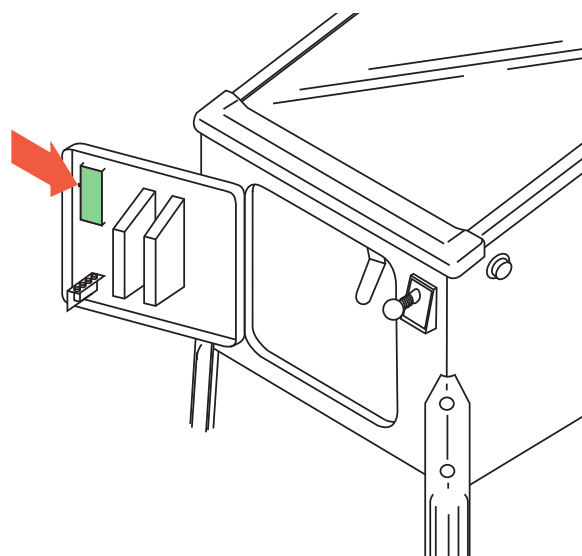


Figure E8. Sound mute disable switch location.

E.2 Coin Door Sound Controls

The Hobbit sound system features a stereo headphone jack on the front of the coin door, along with volume and mute controls (circled in figure E7). To adjust the headphone levels, use the volume up and down buttons. The green LEDs, left of the buttons, will visually indicate sound levels. The overall maximum sound volume in the game is controlled by the red **Up/+** and **Down/-** menu buttons, inside the coin door (or the level selected in the System Settings menu).

Pressing the mute button will completely attenuate all audio signals coming from the game (from the speakers as well as the headphone jack). To prevent players on location from silencing the game, use the mute disable switch on the edge of the Volume Control Board, inside the coin door (see arrow in figure E8). When the slide switch is in the up position, the mute switch is disabled.

WARNING:

Jersey Jack Pinball® encourages you to use the provided headphone jack responsibly. Different ear buds or headphones may produce different sound levels. **ALWAYS** begin with a low output level when connecting headphones and gradually increase the volume to a comfortable level. Pay close attention to and set strict limits for how long you expose your ears to high volume levels through headphones. **DO NOT** turn up the headphone volume on your Hobbit game in an attempt to block out noisy surroundings. Prolonged exposure to high volume levels can cause irreversible damage to your hearing! If you experience ringing in your ears or have difficulty understanding speech, stop listening and have your hearing tested immediately.

E.3 The Hobbit Lighting System

Theory of Operation

The Hobbit lighting system can be divided into three major subcomponents: communications/control, general illumination (GI) and feature lighting. One of the primary design criteria for the new system was parallel control of all lighting in the game; issues with single (or a small group of) LEDs would not affect large areas of the playfield. Modularity and flexibility were also paramount concerns.

The new communications/control hub is the Bus, Accelerometer and GI (BAG) board; it is mounted, vertically, under the center of the playfield (circled in red in figure E9). An onboard microcontroller receives data/commands over a USB connection to the CPU board (**J101**). Controls are then sent out, over an inter-integrated circuit (I2C) bus, to the game's light boards - and more. Communicating over an I2C bus, between printed circuit boards (**J102**, **J103**), adds a great deal of flexibility to the system. Simultaneous control of a wide variety of device types is now possible. In The Hobbit, this I2C bus is used to control the servo motor that moves Smaug's lower jaw - in addition to all of the feature lighting in the game.

GI and feature lighting are independent circuits in The Hobbit. GI functions (lighting under playfield plastics, primarily) are accomplished with single color (cool white) LED boards, whereas RGB LED boards are used for feature lighting (lighting behind playfield inserts, primarily). Since we can control the intensity of the GI board LEDs, they can also be used for accent lighting (under the playfield, in front of the beast faces in The Hobbit) and as flashers (under The Hobbit's left & right side playfield plastics).

The control circuitry for GI lighting resides on the BAG board. 7.5VDC is also run through the board to provide power to all of the GI LED boards around the playfield (above and below). This 7.5VDC is supplied by the 7.5/4VDC Power Supply, inside the cabinet PCB chassis (item 12, pg C-14 of this manual). The BAG board can control up to 72 GI LEDs, 8 through each of 9 driver connectors (**J105-J113**).

A pair of wires runs to each GI LED board. One wire (solid GRY) supplies power to the LED, the other (GRY with a stripe) is the control/return line from the LED; this line is used to vary the LED's intensity. The pairs of wires are bundled together into cable assemblies (pg C-78). The striped wires are color coded to quickly identify which pins each LED connects to at the 16-pin BAG board connector. The first LED in each cable has a drive wire with a BLK stripe, the second has a BRN-striped wire, the third, a RED-striped wire and so on, through the resistor color code (BLK, BRN, RED, ORN, YEL, GRN, BLU, VIO). Color code references for GI wiring are included in GI wiring PF diagrams & tables (pgs C-74 to C-78), BAG board schematics (pg D-59 or D-67) and in BAG board connector pin-out listings (pg D-60 or D-68).

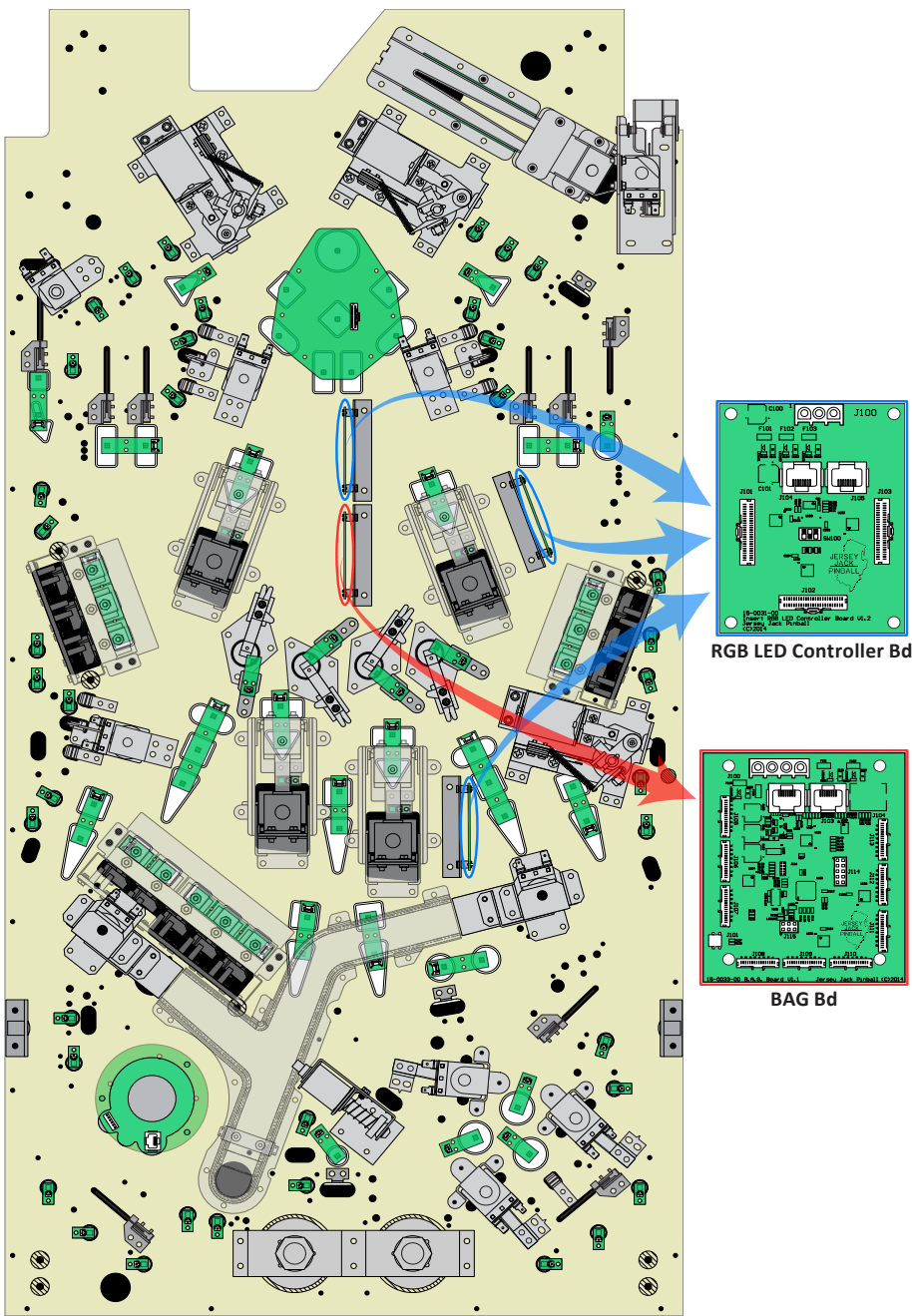


Figure E9. Hobbit lighting system controller boards.

In The Hobbit, three RGB LED Controller boards (circled in blue in figure E9) are used to control the game's feature lighting. 4VDC is run through these boards to provide power to all of the RGB LED boards around the playfield (above and below). This 4VDC is supplied by the 7.5/4VDC Power Supply, located inside the cabinet PCB chassis (item 12, pg C-14 of this manual). Each RGB LED Controller board can control up to 24 RGB LEDs, 8 through each of 3 driver connectors (**J101-J103**). Up to 8 individually addressable (0 through 7) RGB LED Controller boards can be used in a game. Controller board addresses are set using the 3-bank dip switch labeled **SW100**. In The Hobbit, RGB LED Controller board A is set to address 0 (**SW100** -> 000), board B is set to address 1 (**SW100** -> 001) and board C is set to address 2 (**SW100** -> 010).

Communication/control signals are distributed, through CAT5 ethernet cables, between the BAG board (**J103**) and the three RGB LED Controller boards (**J104, J105**). Signals from the BAG board are daisy-chained between the three RGB LED Controller boards, so any unplugged or damaged ethernet cable will interrupt RGB LED control to any controller board(s) downstream.

RGB LEDs are essentially 3 LEDs in one package: one red, one green and one blue. As such, four wires are run to each RGB LED in the game. One wire supplies power to the LED package, the other three are individual intensity control/return lines - one for each LED color: **red, green, blue**. The quartets of wires are bundled together into cable assemblies (pg C-72). The wires are color coded to quickly identify which pins each RGB LED connects to at the 50-pin RGB LED Controller board connector. A base color is used for each set of four wires. The power wire for each quartet is the base color, solid (no stripe); the control/return wire for each LED color is the base wire color with a stripe in that color. For example, if the base color is YEL, the power wire will be solid YEL. The wires controlling red, green and blue intensities will be YEL with a RED stripe, YEL with a GRN stripe and YEL with a BLU stripe, respectively. If the stripe color would match the wire's base color, a GRY stripe is used for that control wire instead.

The first RGB LED in each cable has a wire base color of BLK, the second has a base color of BRN, the third, a base color of RED and so on, through the resistor color code (BLK, BRN, RED, ORN, YEL, GRN, BLU, VIO). Color code references for feature lighting wiring are included in feature lighting PF diagrams & tables (pgs C-68 to C-73), RGB LED Controller board schematics (pg D-35 or D-46) and in RGB LED Controller board connector pin-out listings (pgs D-36, D-39 & D-42 or D-47, D-50 & D-53).

To set the radiant color for an RGB LED, we manipulate the intensity of each LED component, **red, green, blue**. For example, equal intensities of red and blue (along with no intensity of green) will result in a particular intensity of violet. Equal intensities of all three colors will create a certain intensity of cool white. If the LEDs are run at maximum intensity, they will produce very bright lighting effects - but both the driver IC and the LED itself will be working quite strenuously. In this case, the driver/LED combination will draw a lot of current and create a lot of heat (both undesirable). If the LEDs are run at a low intensity, they'll produce very dim lighting effects, but the result will be much less taxing on the driver IC and RGB LED package. We try to run the RGB LEDs somewhere just above the middle of their operating range in most situations. However, the overall feature lighting brightness in the game can be adjusted in the System Settings menu (see pg B-23 of this manual).

E.4 Hobbit Playfield Post Adjustments

Preparations: Ensure that all 5 pinballs are in the trough or completely removed from the game (not in the shooter lane, subway or either of the VUK holes). Power down the game and remove the playfield glass. Pull the playfield up and out of the cabinet, to position 2 (shown on pg A-8 of this manual).

Tools Required:

Ratchet
1/4", deep socket
3/8" open end wrench
11/32" open end wrench
#2 Phillips screwdriver

You can make several post adjustments on the Hobbit playfield to make your game play either more liberally or more conservatively.

- 1)** The steel mini post between the main flippers (circled in red in figure E10) can be removed to make the game play a bit more conservatively. See the mini post removal instructions below. A plastic, fir tree rivet (JJP PN: 30-0082-00) can be used to plug the hole in the playfield.
- 2)** The steel mini post near the left outlane (circled in blue in figure E10) can be repositioned (or removed altogether) to make the game play more or less liberally/conservatively. There are three pre-drilled mounting holes in the playfield. The most liberal post position is the highest (furthest from the player) of the three holes (making it more difficult for the ball to get to the left outlane). As the post is moved closer to the inlane/outlane divider, the game will play more conservatively (making it easier for the ball to get to the left outlane). The most conservative adjustment is to remove the post altogether. See the mini post removal or installation instructions below. No plugs are necessary for the unused holes in the playfield.
- 3)** The plastic post near the right outlane (circled in violet in figure E10) can be repositioned (or removed altogether) to make the game play more or less liberally/conservatively. There are three pre-drilled mounting holes in the playfield. The most liberal post position is the lowest (closest to the player) of the three holes (making it more difficult for the ball to get to the right outlane). As the post is moved further from the player, the game will play more conservatively (making it easier for the ball to get to the right outlane). The most conservative adjustment is to remove the post altogether. See the plastic post removal or installation instructions below. No plugs are necessary for the unused holes in the playfield.

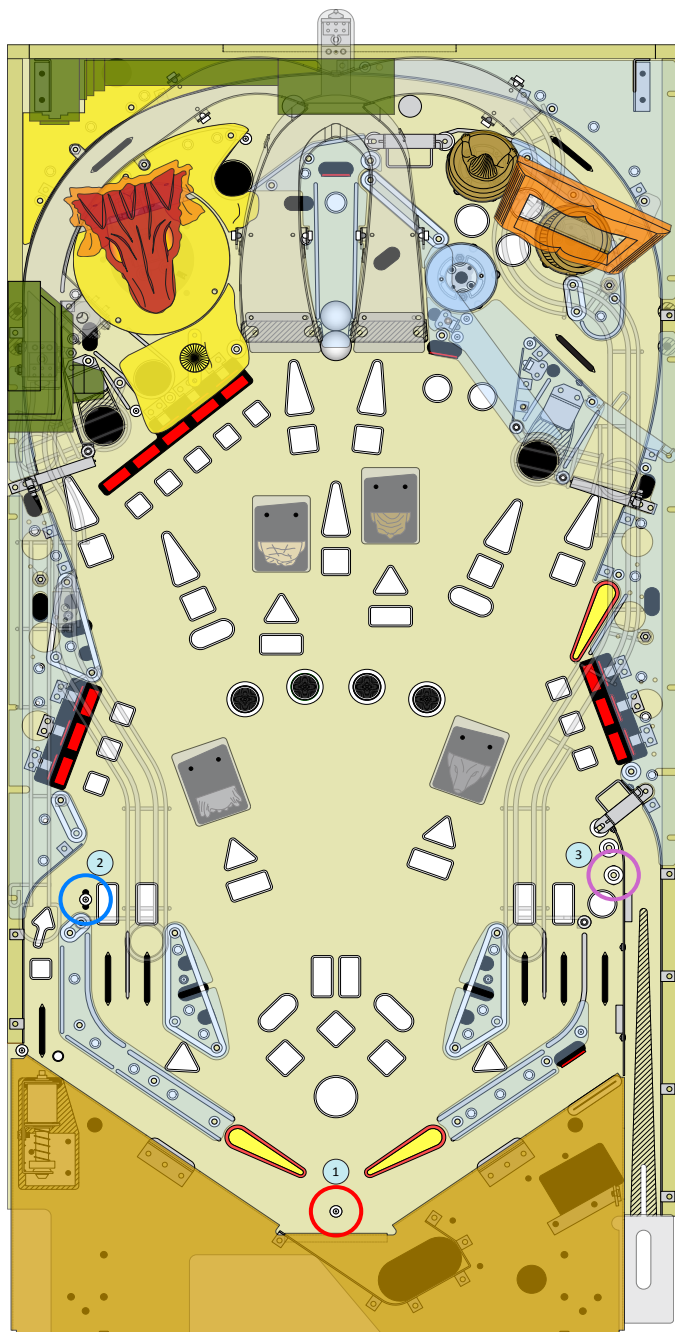


Figure E10. Hobbit playfield adjustable posts.

To remove a steel mini post: The first step is to firmly grasp the rubber ring and pull it straight up, off of the post. Locate the washer and nylon stop nut for the post under the playfield. Using the ratchet and 1/4", deep socket from above and the 3/8" open end wrench from below, remove the nylon stop nut and washer from the bottom of the post. Apply firm pressure to the bottom of the post while slowly continuing to back the post out of the playfield with the ratchet. **WARNING: DO NOT** simply pull the post out; you can damage your playfield surface!

To install a steel mini post: Carefully align the threads of the post with the hole and begin "threading" it, by hand, into the hole (slowly turning it in a CW direction). When it becomes difficult to turn the post by hand, use the ratchet and 1/4", deep socket to continue "threading" it into the playfield. When the threads of the post sufficiently protrude from the bottom of the playfield, install the #10 washer and 10-32 nylon stop nut. Using the ratchet and socket from above and the 3/8" open end wrench from below, carefully tighten the nylon stop nut until the post is pulled all the way down to playfield surface level and firmly held in place. You should not be able to move the post at all by hand when you are done. **DO NOT OVERTIGHTEN!** Lastly, install the post rubber ring, by sliding it over the top of the mini post.

To remove a plastic post and screw: Locate the washer and nylon stop nut for the post under the playfield. Using the #2 Phillips screwdriver from above and the 11/32" open end wrench from below, remove the nylon stop nut and washer from the bottom of the post screw. Carefully pull the plastic post and screw straight up, out of the playfield.

To install a plastic post and screw: Install the rubber ring by sliding it over the top of the plastic post. Push the 8-32 machine screw through the center of the plastic post; ensure that you have the post upright. When upright, the rubber ring will be positioned slightly above the middle of the post. Feed the bottom of the screw through the playfield hole and install the #8 washer and 8-32 nylon stop nut from underneath. Using the #2 Phillips screwdriver from above and the 11/32" open end wrench from below, carefully tighten the nylon stop nut until the plastic post is pulled all the way down to playfield surface level and firmly held in place. You should not be able to move the post at all by hand when you are done. **DO NOT OVERTIGHTEN!**

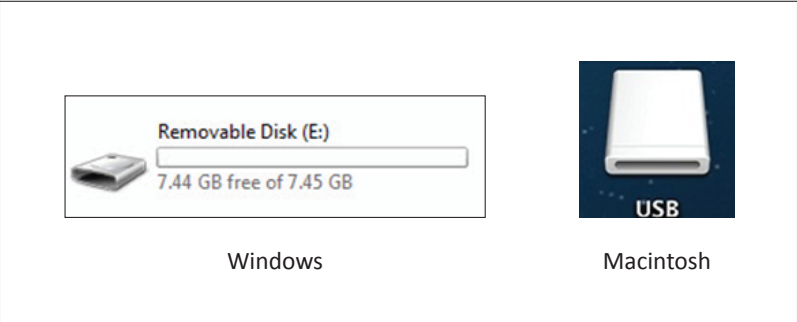


Figure E11. Icons for USB stick.

E.5 Performing a Full Software Update

Preparations: Visit <https://www.jerseyjackpinball.com/support/> and download the latest full Hobbit software update. If you have not already done so, download the UNETBOOTIN utility for Windows or Macintosh.

Tools Required:
Personal computer
8 GB USB memory stick

The full software update is also referred to as a factory reinstallation of game software. At times, a full software update will be the only method for updating your game, as critical, underlying operating system changes are often required.

- 1) Insert an 8 GB USB memory stick into an empty USB slot in your personal computer. **WARNING: All data on the USB stick will be erased during this process!** You should see a new **Removable Disk** under **My Computer** (Windows) or a new **Drive** on your **Desktop** (Macintosh), as shown in figure E11.
- 2) Run the UNETBOOTIN application. The UNETBOOTIN window (shown in figure E12) will open.
- 3) Select the **Disk Image** option, then click the '...' button (both are circled in figure E12). Locate and select the Hobbit ISO file you downloaded from the Jersey Jack Pinball® website.
- 4) Ensure that the **USB Drive** is selected under **Type** and the USB stick you inserted earlier ("E:\\" in this example) is selected under **Drive** (both are circled in figure E12).
- 5) Click the **OK** button to begin the copy/burn process, which will take approximately 10-20 minutes to complete (depending upon the speed of your computer). Again, all data on the USB stick will be erased during this process.

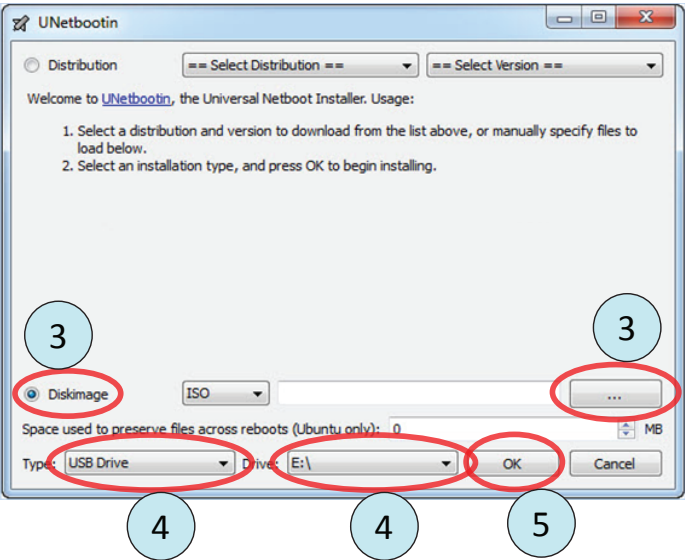


Figure E12. Initial UNETBOOTIN application window.

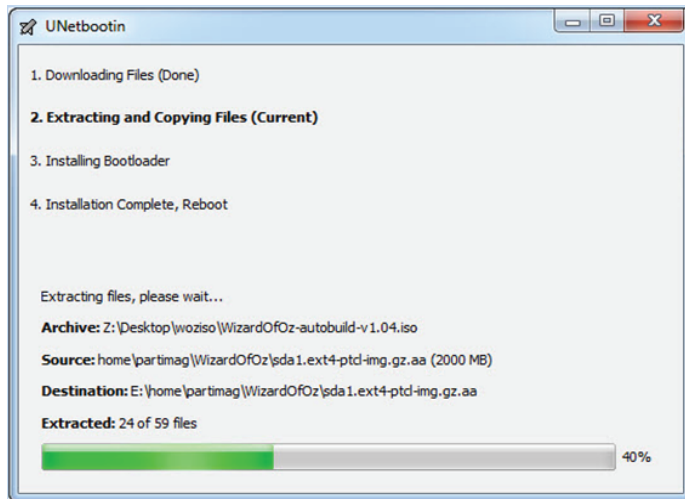


Figure E13. UNETBOOTIN copy/burn progress window.

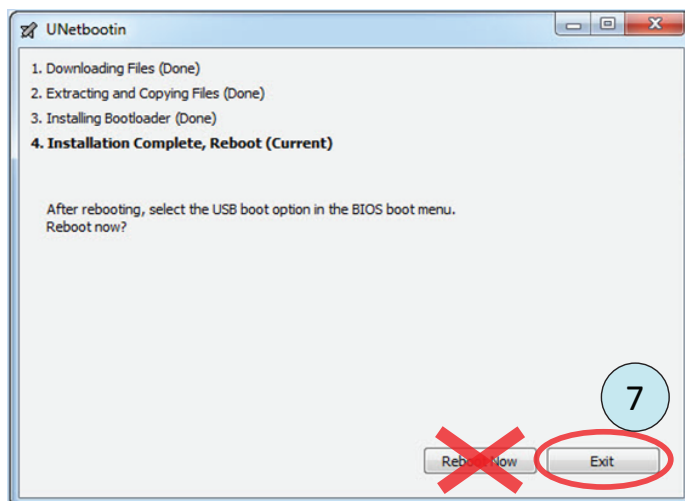


Figure E14. UNETBOOTIN installation complete window.

6) Throughout the ISO image copy/burn process, the window in figure E13 will be displayed and updated.

7) When the copy/burn process is complete, the window in figure E14 will be displayed. **WARNING: DO NOT CLICK THE 'Reboot Now' BUTTON!** Click the **Exit** button or the red X in the upper corner of the window.

8) Remove the USB stick from your personal computer. Power your game down and insert the USB stick you burned into the USB cable attached to the cabinet divider, behind the coin box, just inside your game's coin door.

9) Power up your game with the USB stick inserted. The game will auto-update with no user input; do not power the game down during the update process (which will take less than 5 minutes).

10) When the update is complete, the screen in figure E15 will be displayed on the game's LCD monitor. Power the game down, remove the update USB stick and power it on again. Your game will boot up running the new version of software (which can be verified by entering the Hobbit menu system - see Section B). Store your 8 GB USB stick in a safe place; it can be used to perform another full software update in the future (to this same software version or a newer one).



Figure E15. Update installation complete!

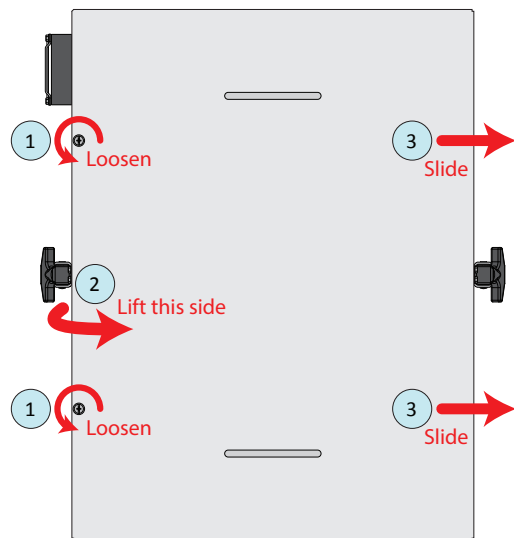


Figure E16. Removing PCB chassis lid.

E.6 Replacing Your Game's CPU Battery

Your game's CPU board uses a 3V coin cell, lithium battery (CR2032) to maintain its basic input/output system (BIOS) settings when the game is powered down. If these settings are lost, the CPU will not boot when the game is powered up. The life expectancy of the CR2032 battery is approximately three years. It is important to change your game's CPU battery before it discharges below 3V. However, in order to preserve the CPU's BIOS settings, the change must be made while the game is powered on. A step-by-step process for replacing the battery is provided below.

- 1) Power the game on and remove the playfield glass (see pg A-7). Leave the coin door open.
- 2) Lift the playfield up out of the cabinet and lean it up against the backbox (position 4, pg A-9).
- 3) Remove the lid of the Cabinet PCB Chassis (see figure E16): ① Loosen the two captive thumb-screws on the lid of the Cabinet PCB Chassis. ② Lift the left edge, ③ slide the lid to the right and lift upward to remove it. **CAUTION:** Be very careful not to drop anything inside the PCB chassis!
- 4) Locate the CPU board (upper right corner of the PCB chassis), then the shiny, CR2032 coin cell battery & holder mounted on its surface (see figure E17). Note the orientation of the battery in its holder (with the battery label/imprint facing *outward*).
- 5) Cut a 3-inch long piece of masking tape and fold it 1 inch from the end. This should form a 1-inch long "handle" and leave a 1-inch long adhesive end.
- 6) Briefly touch the lockdown bar receiver on the game to dissipate any static charge in your body **before** touching the CPU board.
- 7) Carefully affix the adhesive portion of the tape onto the top of the CR2032 battery, applying moderate pressure. **WARNING:** Do *not* flex the CPU circuit board! Rub the surface of the tape, back and forth, to ensure that it attaches well to the battery - *not* the holder.

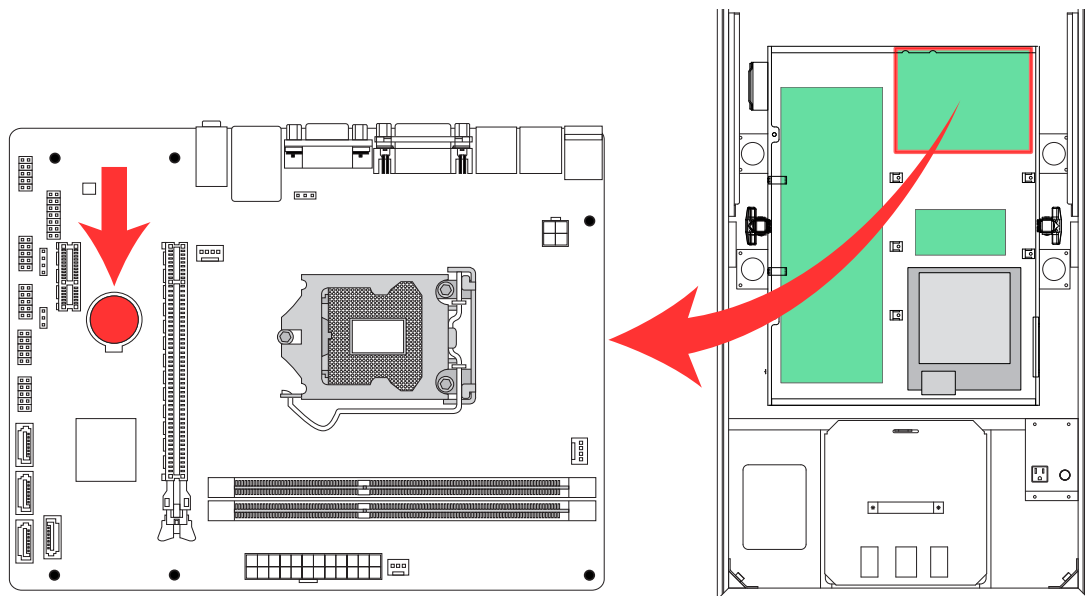


Figure E17. CPU board and battery locations.

8) Holding onto the tape “handle” with one hand, free the battery from its holder clip with the other. Ensure that the battery does not touch anything on the surface of the CPU board as you pull it out of its holder and away from the PCB Chassis.

9) Pull the tape “handle” off of the old battery and apply it to the top of a new CR2032 battery.

10) Again, momentarily touch the lockdown bar receiver on the game.

11) Holding the new battery’s tape “handle”, carefully insert it into the battery holder, in the same orientation as the old one (battery label/imprint facing *outward*). Ensure that the battery snaps into its holder properly.

12) Carefully remove the tape “handle” from the top of the new battery, ensuring that you do not pull the battery out of its holder in the process.

13) Replace the Cabinet PCB Chassis lid: Align the lid with the PCB chassis. Slide the two notches on the lid into the slots near the top of the right chassis side. Lower the left edge of the lid until its thumbscrews align with the PEM inserts on top of the left chassis side. **CAUTION:** Be careful not to pinch any wires in between the lid and the chassis! Hand tighten both thumbscrews down firmly.

14) Lower the playfield back down into the cabinet.

15) Slide the playfield glass back into the cabinet.

16) Replace the lockdown bar and close the coin door.

Note: If your game’s CPU battery discharges below 3V (or if you remove the battery) while the game is turned off, all BIOS settings will return to factory defaults. As a result, your game will not boot properly the next time you attempt to power it up. In this case, contact JJP® technical support for assistance in restoring your CPU BIOS settings and getting your game to successfully boot again.



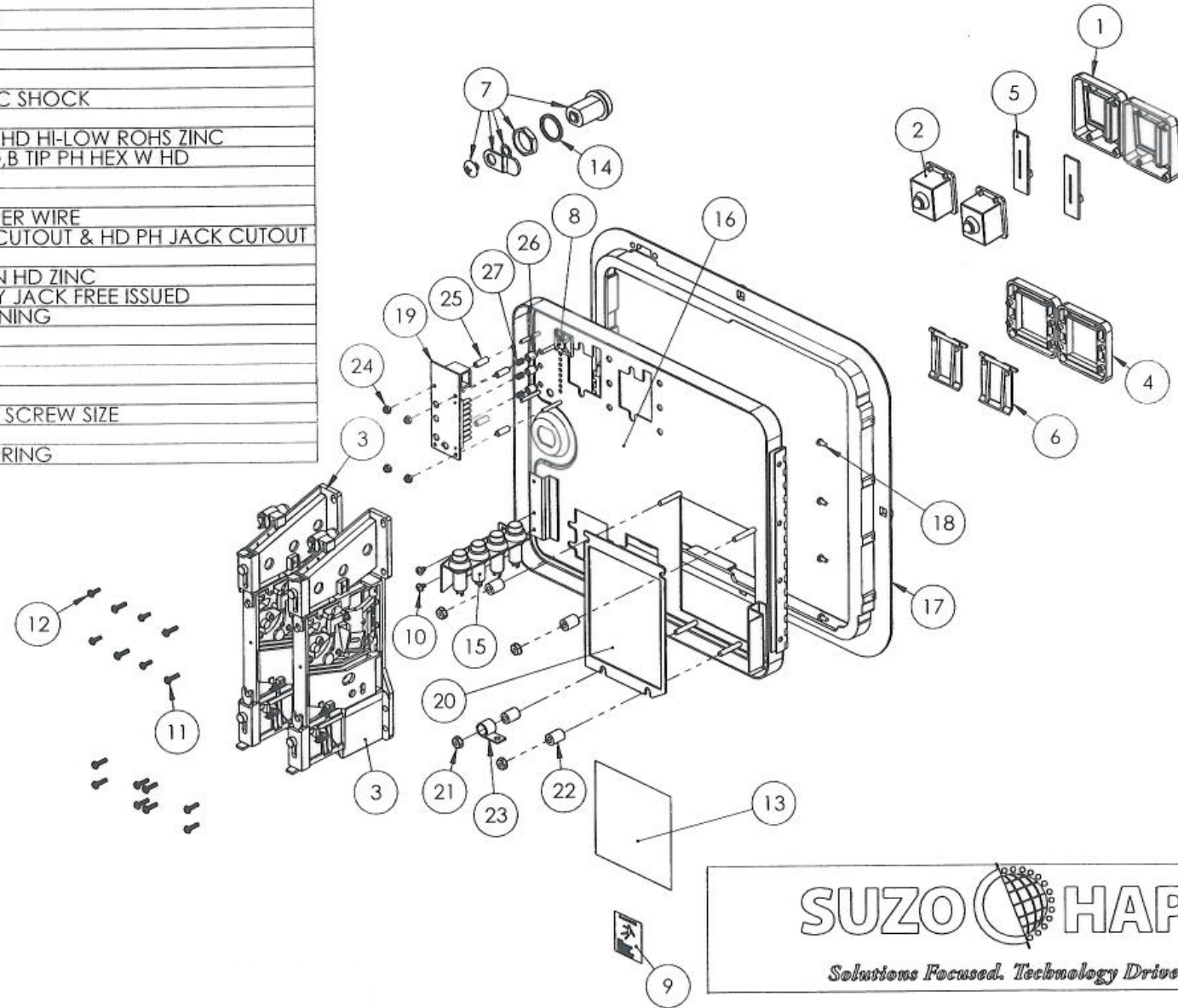
Appendices



25¢ USA Coin Door Assembly JJP® PN 40-0001-00

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	42-0231-00D	ENTRY BEZEL, IL, PLASTIC
2	2	42-0517-05D	REJECT BUTTON ASSY. YELLOW W/HAPP .25 INSERT
3	2	42-8156-10D	MECH HOLDER .25 HAPP 6V555 LMP SW NEW DC TYPE LAMPHOLDER
4	2	42-0232-00D	RETURN BEZEL, IL, PLASTIC
5	2	42-1247-20	NEW COIN ENTRY RESTRICTOR WITH 2 TEETH
6	2	42-0119-00D	RETURN DOOR FLAP, PLASTIC
7	1	42-0641-00	LOCK ASSY 7/8 W/1 1/8" STRAIGHT CAM
8	1	43-0127-00	TIE PLATE
9	1	95-0278-00	DANGER LABEL FOR COIN DOORS ELECTRIC SHOCK
10	2	890-1015-02	SCREW #6x1/4"
11	12	48-1000-00	SCREW, F/BEZEL LONG 6 X 12 HEX WASHER HD HI-LOW ROHS ZINC
12	4	43-1003-00	SCREW, SPL F/PLAST, #4 X .42/.39 SPL HI THD, B TIP PH HEX W HD
13	1	890-1060-00	LABEL UPSTACKER INSTRUCTIONS
14	1	42-0254-02	LOCK WASHER, F/LOCK 3/4" INTERNAL
15	1	96-0436-04	HARNESS ASSY W/DIODE, 4 BUTTONS, JUMPER WIRE
16	1	42-0612-00	PINBALL COIN DOOR W/CREDIT CRD VAL CUTOUT & HD PH JACK CUTOUT
17	1	891-1701-016	FRAME STD DRII S2000 NOTCH BLK
18	4	890-1002-00	SCREW F/ HINGE M3X6MM .5 PITCH PH PAN HD ZINC
19	1	FI-0088-00	COIN DOOR VOL PCB W/LIGHT PIPE JERSEY JACK FREE ISSUED
20	1	891-0100-4016	BLANKING PLATE DBV (BLACK) LARGE OPENING
21	4	42-0082-00	NUT, KEPS 8-32
22	4	890-1051-00	SPACER
23	1	03-7655-6	CABLE CLAMP, 3/8" DIA.
24	4	43-1322-00	NUT NYLOCK, 4-40 HEX
25	4	43-0720-00	NYLON SPACER 3/16" OD, 1/2" LENGTH, #4 SCREW SIZE
26	3	43-0709-00	COIN DOOR PUSH BUTTON ACTUATOR
27	3	43-0714-00	COIN DOOR ACTUATOR COMPRESSION SPRING

NOTE: Suzo-Happ parts and numbers are listed above.

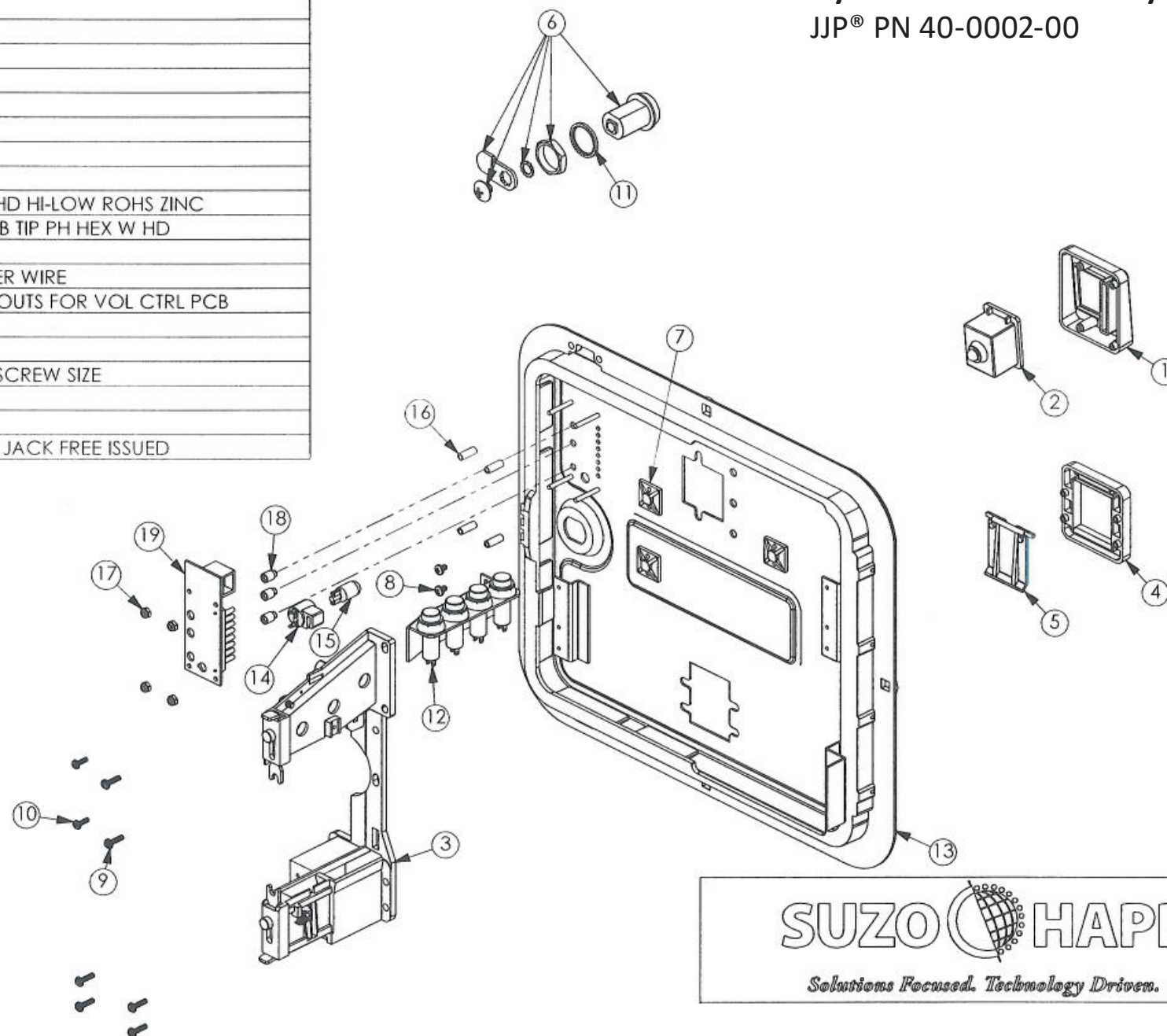


SUZO HAPP
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NOTES:
ITEMS NOT SHOWN:
90-1013-00 (TIE WRAP), QTY 3
S-11136 CABLE TIE QTY 1
INS-0024 (INSTRUCTIONS ULT \$.25 US COIN MECHANISM), QTY 1
036-5509-25 HARNESS, PIN DOOR 2 SLOT & VAL W/SLAM CONNECTOR, QTY 1
TEST COIN DOOR USING TESTER # HT-126, HT-127

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	42-0231-00D	ENTRY BEZEL, IL, PLASTIC
2	1	42-0930-00	REJECT BT ASSY YL W/UNIV FINGER LOGO
3	1	42-7355-00D	MECH HOLDER
4	1	42-0232-00D	RETURN BEZEL, IL, PLASTIC
5	1	42-0119-00D	RETURN DOOR FLAP, PLASTIC
6	1	42-0641-00	LOCK ASSY 7/8 W/1 1/8" STRAIGHT CAM
7	3	43-0127-00	TIE PLATE
8	2	890-1015-02	SCREW #6x1/4"
9	6	48-1000-00	SCREW, F/BEZEL, LONG 6 X 12 HEX WASHER HD HI-LOW ROHS ZINC
10	2	43-1003-00	SCREW, SPL F/PLAST, #4 X .42/.39 SPL HI THD, B TIP PH HEX W HD
11	1	42-0254-02	LOCKWASHER, F/LOCK 3/4" INTERNAL
12	1	96-0436-04	HARNESS ASSY W/DIODE, 4 BUTTONS, JUMPER WIRE
13	1	42-0693-00	WELLS DOOR & FRAME ASY PINBALL W/CUTOUTS FOR VOL CTRL PCB
14	1	42-0351-00D	LAMP HOLDER
15	1	91-1319-00	LAMP #555 6.3V
16	4	43-0720-00	NYLON SPACER 3/16" OD, 1/2" LENGTH, #4 SCREW SIZE
17	4	43-1322-00	NUT NYLOCK, 4-40 HEX
18	3	43-0709-00	COIN DOOR PUSH BUTTON ACTUATOR
19	1	FI-0088-00	COIN DOOR VOL PCB W/LIGHT PIPE JERSEY JACK FREE ISSUED

NOTE: Suzo-Happ parts and numbers are listed above.



Euro-Style Coin Door Assembly

JJP® PN 40-0002-00

NOTE:
ITEMS NOT SHOWN:
90-1013-00 - TIE WRAP - 3,
S-11136 CABLE TIE 5" LENGTH .14WIDTH 40LB NATURAL

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Acronyms & Abbreviations

A	Ampere	FH	Flat Head	MS	Machine Screw	SEMS	Integral Star Lock Washer
AC	Alternating Current	F-M	Female - Male	Mtg	Mounting	SMD	Surface-Mounted Device
Adj	Adjustable	Fm+	Fast-mode Plus	N/A	Not Applicable	SMS	Sheet Metal Screw
Assy	Assembly	ft	Feet	nF	Nanofarad	SMT	Surface Mount Technology
Aux	Auxiliary	ga	Gauge	nm	Nanometer	SOIC-	Small-Outline Integrated Circuit (IC Package)
BAG	Bus, Accelerometer & GI	GB	Gigabyte	NPN	Transistor Type	SPDT	Single Pole, Double Throw
BB	Backbox	GI	General Illumination	NS	Not Specified	SPST	Single Pole, Single Throw
Bd	Board	GND	Ground	ns	Nanosecond	Std	Standard Edition
Bidir	Bidirectional	GRN	Green	Ω	Ohm	STP	Shielded Twisted Pair
BLK	Black	GRY	Gray	OD	Outside Diameter	Sync	Synchronous
BLU	Blue	HWH	Hex Washer Head	OLED	Organic Light-Emitting Diode	TAN	Tan
Brkt	Bracket	I2C	Inter-Integrated Circuit	ORN	Orange	Tgt	Target
BRN	Brown	IC	Integrated Circuit	PCB	Printed Circuit Board	TH	Truss Head
CAT5	Category 5 Ethernet Cable	I/O	Input/Output	pcs	Pieces	TO-	Transistor Outline (Transistor Package)
CCW	Counterclockwise	IR	Infrared	PEM	Brand Name, Threaded Insert	TVS	Transient Voltage Suppressor
Ch	Channel	ISO	International Organization for Standardization	pF	Picofarad	TX	Transmitter
CMOS	Complementary Metal-Oxide Semiconductor	J	Joule	PFH	Phillips Flat Head	μF	Microfarad
Col	Column	JJP®	Jersey Jack Pinball®	PLM	Plum	UFm	Ultra Fast-mode
Const	Constant	kΩ	Kilo Ohm	PPH	Phillips Pan Head	USB	Universal Serial Bus
CP	Cup Point	kHz	Kilohertz	PPM	Parts Per Million	V	Volt
CPU	Central Processing Unit	LAN	local area network	PF	Playfield	VGA	Video Graphics Array
CS	Cap Screw	LCD	Liquid Crystal Display	PNK	Pink	VIO	Violet
CW	Clockwise	LE	Limited Edition	PN	Part Number	VUK	Vertical Up-Kicker
DBA	Dollar Bill Acceptor	LED	Light-Emitting Diode	pos	Position	W	Watt
DC	Direct Current	Lg	Large	Qty	Quantity	WS	Wood Screw
Diam	Diameter	LT BLU	Light Blue	RCA	Brand Name Connector	w/	With
DIP	Dual Inline Package	LVDS	Low-Voltage, Differential Signaling	RED	Red	WHT	White
Diff	Differential	mA	Milliampere	rev	Revision	XCVR	Transceiver
DPDT	Double Pole, Double Throw	M-F	Male - Female	RF	Radio Frequency	YEL	Yellow
Drvr	Driver	MHz	Megahertz	RGB	Red, Green, Blue	"	Inch
DVI	Digital Video Interface	MLCC	Multi-layer Ceramic Capacitor	Rnd	Round		
ea	Each	MOV	Metal Oxide Varistor	Rt	Right		
Elect	Electrolytic	M-M	Male - Male	RX	Receiver		
EOS	End of Stroke	mm	Millimeter	SATA	Serial Advanced Technology Attachment		
F-F	Female - Female	MOSFET	Metal-Oxide Semiconductor Field-Effect Transistor	SD	Secure Digital		
FCC	Federal Communications Commission			SH	Socket Head		



Jersey Jack Pinball®

Limited Manufacturer's Warranty



The manufacturer of this Pinball Machine, Jersey Jack Pinball® ("JJP®"), warrants to the holder of a valid proof of purchase ("Purchaser" or "You") that the Pinball Machine ("Machine" or "Product") is free from defects in material and workmanship, pursuant to the following terms and conditions, when installed and used normally and in accordance with operation instructions.

What does the Limited Warranty cover - and for how long?

1. The JJP® "Bumper to Post" Limited Warranty covers every part in your new Jersey Jack Pinball® Machine for a period of 30 days from the date of delivery of the Machine to its original Purchaser.
2. In addition, the JJP® Sound Board, I/O Driver Board, CPU, 0.96" OLED Monitor, 27" LCD Monitor and RGB LED (Light) Boards are covered for a period of one year from the date of delivery of the Machine to its original Purchaser. If the Machine is used for commercial purposes (any use other than in-home use), the JJP® Sound Board, I/O Driver Board, CPU, 0.96" OLED Monitor, and 27" LCD Monitor and RGB LED (Light) Boards are covered for a period of 6 months from the date of delivery of the Machine to its original Purchaser.

Who is entitled to Warranty coverage? The original Purchaser.

What will JJP® do? JJP® will repair or replace any covered part at no charge for the part, exclusive of shipping and handling charges or any labor to install the part.

What is not covered? The Limited Warranty does not cover any labor or service calls necessary to replace any part which is a result of improper installation, shipping or handling charges, negligence, misuse, abuse, alteration, modification, rust of any kind, damage caused by electrical surge or by intrusion of any liquid, repairs by persons other than our authorized service personnel, fire, theft, acts of God (such as a flood), and/or improper electrical connection.

What must I do? In order to be eligible for coverage you must register your JJP® Machine within 5 days of delivery on-line at www.JerseyJackPinball.com, by emailing Service@JerseyJackPinball.com or by calling 732-364-9900.

If a covered part requires repair or replacement, email us at Service@JerseyJackPinball.com or open a service ticket at the Jersey Jack Pinball® website and enter a brief, written description of the problem. You may also call us at 732-364-9900; however all warranty claims must be in writing. For repair or replacement, the covered part must be shipped, prepaid, to us or to an authorized JJP® distributor. The repaired, or replacement part, will be returned to You upon warranty verification. In the event that You want a replacement part in advance of returning the original part to JJP®, you must order the part from your authorized distributor and advance the retail cost for the replacement part. The original part must be returned within 21 days for warranty verification. Upon verification of warranty, the amount paid for the advance replacement part will be fully refunded.

State Law Rights: This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

Exclusive Agreement: This limited warranty is the complete and exclusive agreement between You and JJP®. It supersedes all other written or oral communications related to this Product. JJP® provides no other warranties for this Product. The warranty exclusively describes all of JJP®'s responsibilities regarding the Product. There are no other express warranties. No one is authorized to make modifications to this limited warranty and you should not rely on any such modification.

Limitations: Implied warranties, including those of fitness for a particular purpose and merchantability (an unwritten warranty that the Product is fit for ordinary use) are excluded. Some states do not allow the exclusion or limitation of implied warranties, so the above limitation or exclusion may not apply to you.

In no event shall JJP® be liable for any indirect, special, incidental, consequential, or similar damages (including, but not limited to, lost profits or revenue, inability to use the Product, or other associated equipment, the cost of substitute equipment, and claims by third parties) resulting from the use of this Product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

WARNINGS & NOTICES

WARNING
FOR SAFETY AND RELIABILITY, substitute parts and equipment modifications are not recommended. Use of non-Jersey Jack Pinball® parts or modifications of game circuitry, may adversely affect game play, or may cause injuries. Substitute parts or equipment modifications may void FCC/Canada Type Acceptance.

PROLONGED EXPOSURE to high volume levels through the coin door headphone jack can lead to irreversible hearing loss. See page E-8 of this manual for more information.

BECAUSE THIS GAME IS PROTECTED by Federal copyright, trademark and patent laws, unauthorized game conversions may be illegal under Federal law.

THIS 'CONVERSION' PRINCIPLE ALSO APPLIES to unauthorized facsimiles of Jersey Jack Pinball® equipment, logos, designs, publications, assemblies and games (or game feature not deemed to be public domain), whether manufactured with Jersey Jack Pinball® components or not.

IF THE LINE CORD IS DAMAGED, it must be replaced with a cord provided by the game manufacturer (or an equivalent) in order to avoid a hazard.

Notice
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WARNING
NOTE: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

RF Interference Notice
CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

FCC/CANADA STICKER. Check the back of your game to verify that an FCC/Canada-certification sticker was attached to your game at the factory. All Games that leave the Jersey Jack Pinball® plant have been tested and found to comply with FCC/Canada Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor may result if the sticker is missing. If you receive a game that has no FCC/Canada sticker, call Jersey Jack Pinball® for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

FOR SERVICE...		Jersey Jack Pinball®
CALL your authorized	or VISIT our support site:	1645 Oak Street
Jersey Jack Pinball® Distributor	https://www.jerseyjackpinball.com/support/	Lakewood, NJ 08701

CAUTION: Transport this game ONLY with the hinged backbox DOWN!